THE
ELECTRICAL REVIEW

Volume CXXVII. No. 3277

Friday, September 13th, 1940

Contents

	Page
Editorial—Cooker Development	213
The Domestic Cooker	215
Testing Insulators. By W. Subak	217
Correspondence	218
Switchgear Layout. By A. J. Nicholas, A.M.I.E.E.	219
Personal and Social	221
Uniform Tariffs. By H. Southall	222
New Electrical Products	223
Commercial and Industrial	224
Load Building in Sydney	226
Evacuation and Hire-purchase	227
Electricity Supply	228
New Patents	229
Financial Section	230
Contract Information	233
Classified Advertisements (Official Notices, Situations Vacant, etc.)	39
Index to Advertisers	62

EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1

Telegraphic Address: "Ageekay, Sedist, London." Code, A.B.C. Telephone No.: Waterloo 3333 (35 lines)
Subscription Rates, Postage free: United Kingdom, £1 16s. 10d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum
Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank"

IOCO

INSULATIONS

"LINAPEX" VARNISHED CLOTHS & TAPES
Straight Cut, Bias Cut. Seamless and stitched.

"LINAPEX" VARNISHED SILKS & TAPES

"LINAPEX" OILED PAPERS
For Telephone Insulation, etc.

"FORMAPEX" MIOCARTA SHEETS
Grade I. B.S.S. 547 — P.F.
Grade II. B.S.S. 316 — P.O.
Punching Quality — P.Q.

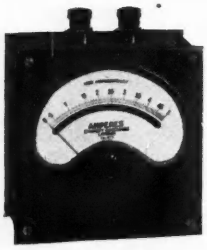
"FORMAPEX" MIOCARTA TUBES
Wrapped P.G. Moulded P.P.

"FORMAPEX" VARNISHED PAPERS
B Quality. Coated for wrapped tubes.
L Quality. Impregnated for moulded tubes, etc.

Write for Booklets on Insulation—post free.

THE IOCO RUBBER & WATERPROOFING CO., LTD.
NETHERTON WORKS • ANNIESLAND • GLASGOW

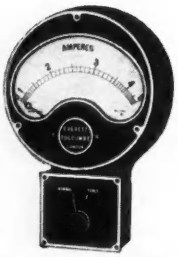
OTHER EVERETT EDGCUMBE PRODUCTS INCLUDE—



"CADET" PORTABLE

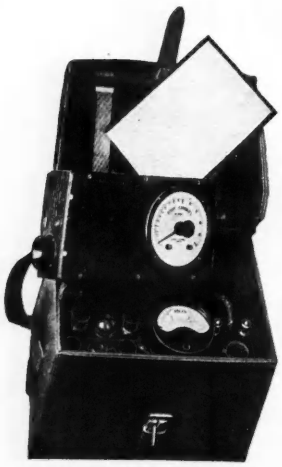
Ammeters, Voltmeters Wattmeters and Power Factor Meters.

Comprise a series of light, handy and accurate instruments admirably adapted for industrial and factory testing.



"SUPERSCALE" LEAKAGE INDICATORS

are available for three-phase earthed systems—where the neutral point is accessible or inaccessible—two-phase—single-phase—and all D.C. systems. An outstanding feature is the low range which facilitates the detection and removal of faults in the early stage of development.



LOW RANGE PHOTO-METER (for A.R.P. Lighting)

Measurement of illumination as low as 0.0002 foot-candle, surface brightness and candle-power.
Direct reading and complete portability are other features.

POWER FACTOR METERS

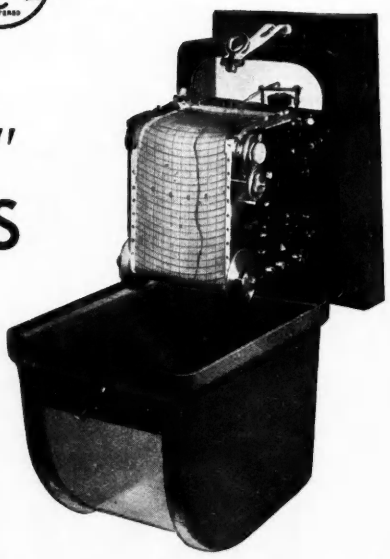
SINGLE & POLYPHASE SWITCHBOARD AND PORTABLE PATTERNS

EVERETT EDGCUMBE "Rotary" Power Factor Meters possess the following distinctive characteristics :—

- The scale extends over the whole circumference of the dial.
- They indicate "Leading" and "Lagging" power factor in both forward and reverse directions.
- No moving coils, ligaments or brushes are used.
- They are independent of ordinary variation of voltage, current and frequency.

"INKWELL" Graphic Power - Factor Recorders give a continuous record of the changes in power factor, and having roll charts and a constant ink supply, require a minimum of attention.

"INKWELL" GRAPHERS



maintain their Leadership with the following exclusive features:—

- **A roll chart, constant ink supply and synchronous motor drive, ensure almost automatic operation.**
- **Unique inking mechanism secures accuracy and sensitiveness.**
- **The ink supply is self-adjusting.**
- **Evenly divided charts for alternating and direct current.**
- **Synchronous records on all graphic instruments assured by Synclock motor drive.**
- **They comply with British Standard Specification 90.**
- **20 years' successful service throughout the world.**

Write for Catalogue

EVERETT EDGCUMBE

Manufacturers of all kinds of indicating and recording electrical instruments and photometry experts

COLINDALE WORKS, LONDON, N.W.9

THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVII. No. 3277 SEPTEMBER 13, 1940 Price SIXPENCE

Cooker Development

Design, Load and Service Problems

AT this time when it is inevitable that industrial electricity supply must take precedence over domestic supply we see good reason to take stock of the cooker position we had reached when the war started, in view of certain peculiarities of development.

A few years ago a great push was given to the domestic cooking business by the supply section of the industry and this seemed immediately before the war to approach a point of instability. Why? It is said that the cooker business was over-developed, with the result that undesirable load characteristics were created. To our mind this is another way of saying that the load was not developed along scientific load-building lines but was merely treated by the cruder methods of pure salesmanship. So confident are we in this view that we deprecate all suggestions now fashionable in certain quarters that the cooker load is an undesirable one.

Responsibility for Design

We are not, however, very perturbed over the question because we know that our more progressive undertakings are tracing the development along the proper lines and that one day those whose job it is will have been shown the correct way to give a general lead by propaganda.

What we are concerned about, however, is the fact that the supply section of the industry still holds the key to progress in cooker design. The supply engineer has dictated design right from the early days and at first that was all to the good, because, as with so many electrical developments, the supply undertaking alone had a reasonable appreciation of what was wanted in the first place. We must realise now, however, that the manufacturer has had many years of design and production experience in conjunction with which he has set up research facilities, so that now he should obviously take the reins.

The difficulty in this particular case lies in the fact that because the bulk of cooker business takes the form of hire and hire-purchase schemes, the supply undertaking must necessarily be the purchaser of the cookers from the manufacturer. If it is true, as some manufacturers believe it is, that supply undertakings are becoming willing to relax their hold in the direction indicated, then there is every reason to believe that as soon as peacetime development is permitted considerable advance may be made in cooker development technically and constructionally —mainly because the consolidation of ideas asked for in an article in this issue will be possible.

Twelve or so years ago, and indeed more recently, we were told that the cooker as we knew it then was unstable and that revolutionary changes would be brought about. Have we seen such revolutionary changes? If not should we have seen them? Has development been along the right lines? Is it correct to leave the position exactly as it was when the war commenced as a re-starting point after the war. All these questions need thorough consideration and we know that there are many consumers' engineers who are anxious to get a lead in doing so, in order that advantage may be taken of the present lull to avoid a recurrence of mistakes of the past and to prepare for what is likely to be a hard time economically for the industry after the war.

But there is more in it than that, for although we are all agreed that proper progress can only be made if we have sound co-operation between the various sections of the industry, such co-operation will not be possible until all are agreed as to which is the correct section to handle the matter of design.

Maintaining Cookers in Service

There can be no doubt that, but for the strong support given by supply undertakings to the idea of service to the consumer during the earlier years, cooker development could not have made the headway it has. But this servicing has all along been associated with cooker hiring schemes; it is essential for the suppliers to maintain the cooker (their own property) in order. If, as has been suggested, cooker hiring by the consumer from the undertaking is to be replaced or supplemented by hire-purchase from the manufacturer, will the consumer be able to enjoy the benefits of the undertaking's servicing experience? It will be a big setback to cooker development generally if the consumer of any class is to be denied what has in the past been proved to be such an enormous advantage to the undertaking as well as to the consumer, and we emphasise this point because we know of cases in which consumers who applied to their undertakings for new hotplates were referred to local contractors simply because the cookers were their own property.

Maintaining Supply

TRIBUTES are everywhere being paid —and how well deserved they are our readers readily recognise—to the magnificent part played by the fire, A.R.P. and other public services in resisting during the past week the long-threatened air attack on London. By no means the least deserving of honour are the men who have been prompt to make good the damage to electrical systems. We are, for obvious reasons, unable to particularise, but it can at least be said that they have carried out repairs in dangerous conditions, often under bombardment, thereby enabling factories to be kept running and the food of the workers to be cooked. There are those also who have the task, equally difficult in its way, of standing by ready to meet eventualities that have not yet arisen. Electrical works of all kinds are military objectives and, presumably, would receive the first attention of the enemy. They are in the charge of men who have long been schooled in a tradition of keeping the supply going in the face of odds and personal hazards, even in normal times. We have every confidence that these men can be relied upon to continue to do their duty in the same spirit of self-devotion, whatever the calls that may be made upon them in the weeks to come.

Hire-purchase Transfers

ABOUT a quarter of the membership of the Incorporated Municipal Electrical Association has agreed to support the Association's proposal that hire-purchase agreements with "evacuated" consumers shall be transferred to the supply undertakings of the towns to which they go. It is noticeable that the acceptors of the scheme are largely evacuation area authorities, so that it would seem that it is those in the reception areas who hesitate—which is perhaps natural. All the same, in the present conditions there should be some effort on the part of the more fortunate to assist those who have been badly hit by the war. As Mr. A. L. Burnell, of the London J.E.A., has said, other than purely mathematical considerations have to be taken into account. On the financial side there seems to be little probability of serious loss, if any. Perhaps the transferred apparatus is held to represent an unwanted load; but even in reception areas there should be sufficient margin to accommodate what is unlikely to be an overwhelming extra demand. The same consideration applies to the clerical work involved. Installation and maintenance may be difficulties, of course, but these are not insuperable given that measure of good will which should prevail between members of such a body as the I.M.E.A.

Electricians' Wages

SINCE the appearance of the Conditions of Employment and National Arbitration Order, which, in effect, legalises the rates of wages paid by "good" employers and thus tends to eliminate undercutting, we have had many inquiries for the rates of wages payable in the electrical contracting industry. These have come from both employers and workers, who should, of course, belong to their appropriate trade organisations, but we have passed on the information to them. We think that it may save time and effort if we print the current rates again. They are as follows:—Grade A, 1s. 9½d. per hour (subject to an addition of 5 per cent., making a total of 1s. 10½d.); Grade B, 1s. 7½d. per hour (with an addition of 1d. per hour in the Mersey district in lieu of travelling time); Grade B2, 1s. 7d. per hour, and Grade C, 1s. 6½d. per hour. In addition to these standard rates there is a war addition, which is 10s. 5d. per week up to and including the first pay day in October. The rate for electricians' mates is 80 per cent. of the journeyman's rates. The war addition has risen from 3s. 6d. from the second pay day in November last year to 5s. 10d. from the second pay day in January and 9s. 2d. from the second pay day in April. The present bonus came into operation as from the second pay day in July. The current rate of pay for Scottish electricians, whose wages are determined separately, is 1s. 9½d. per hour, which includes a war bonus of 2½d.

Dispersal of Control

CERTAIN serious failures in electricity supply during the past few years, regarded as important at the time, served a purpose in bringing to light weaknesses in prevalent arrangements of switchgear. Electrical engineers have not been slow to profit by these experiences and are thus better able to meet the far more serious menace to continuity that arises to-day. In this issue Mr. A. J. Nicholas discusses measures for decentralising control so as to prevent connections to two sources of supply being out of action at the same time. This is in logical sequence to an earlier article in which he emphasised the paramount need to make it possible to operate busbar sectioning switches in safety. That article was written without war conditions in view and his present contribution should not be regarded merely as an emergency measure. To spend money in the way advocated really antedates expenditure that would be necessary when normal conditions return in order to keep technique abreast of developments due to growth in the demand for electricity.

Labour for Export Work

SOME apprehension was felt by manufacturers engaged on export orders that no specific reference was made in the Industrial Registration Order to the special position of the men employed by them. It seems that they were not all aware of the Explanatory Memorandum which was issued at the same time and from which we quoted in our issue of August 16th. This said: "Some of those who register will . . . . be found so important for the maintenance of exports that it appears undesirable to transfer them. After registration, all questions of transfer will be considered individually in the light of the relative importance of the work on which men are now engaged and that for which they are required." Last week a statement was issued by the Board of Trade, after consultation with the Ministry of Labour and National Service, emphasising the Government's view that workers in export trades are engaged in work of essential national importance. The relative needs of the munitions industries and export production have to be carefully weighed up especially as regards skilled labour which is at a premium. It is the expressed desire of both Ministers that there shall be as little disturbance as possible to skilled labour which is essential to the export trade but it is pointed out in the statement that occasions may arise when the need for labour for munitions production will be paramount.

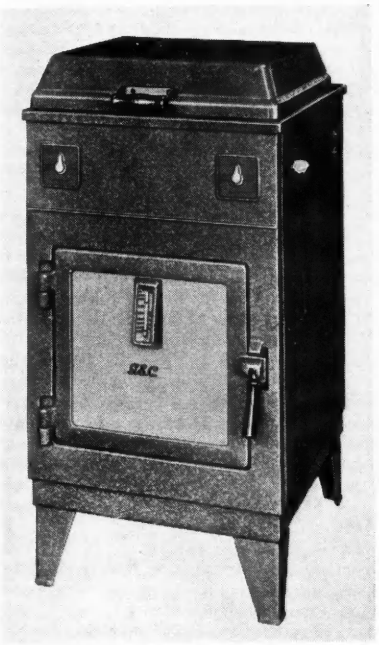
Export and the Home Market

WE drew attention last week to the substantial increase in American export trade, and suggested that the United States was gaining from the disappearance of European suppliers from the South American markets. Referring to this and other related matters, the August *B.E.A.M.A. Journal* says that it is apparent that the competition for overseas markets is becoming more intense at precisely the moment when the need to increase our export trade is greatest. Steps taken by the Government to foster export trade are mentioned, but, it is said, if the export drive is to be successful the problem of prices will require careful watching. The cotton trade has initiated a policy of subsidising export by increased home prices. The home trade has always carried a goodly portion of export cost, but now the home market is being deliberately restricted. Our contemporary repeats a warning which we ourselves have uttered in the past, that there is a limit to this restriction if the basis of export trade is not to be cut away.

THE DOMESTIC COOKER

Consolidating Ideas on Design

WHEN we first hinted at publishing at the present time a survey of domestic cooker developments, the idea was frowned upon in some quarters; it was asked if this was really the time to deal with a development which must necessarily play a very minor part during the period of the war? We therefore gave the matter the closest consideration, which brought to light certain facts which have encouraged us to proceed with the scheme. Our original notion was based on the belief that cooker development had got somewhat out of hand, and that before the war the time was overdue for a consolidation of ideas. We now find that many consumers' engineers and even manufacturers are anxious to take advantage of the present lull to fit themselves for the revival of the cooker business after the war.



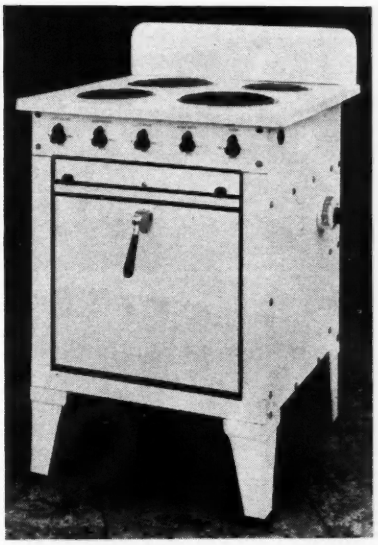
The storage cooker must be nursed until the industry is ready to receive it

To support our contention that a consolidation of ideas is vitally necessary before we can advance much farther, we have only to mention that before the war some individual manufacturers had to produce thirty or more models of electric cookers to keep pace with the demands of supply undertakings, and it was becoming evident that the great divergence of ideas was not having too good an effect on existing and prospective consumers. We have already seen an abortive attempt at standardisation of design, and we do not suggest a reopening of the cooker business with anything which would be likely to arrest technical developments.

All we ask now is open appreciation of the facts that the cooker, as we have known it for ten years or so, is a thoroughly reliable piece of apparatus and a sound commercial article; that the advantages of electric cooking can easily be proved to the housewife; that the supply engineer must take a broader view of initial cost and look beyond his "black cooker" problem; that the primary function of a cooker is to cook; and that high thermal efficiency means far less than a psychology created by the technical training of two or three decades past will admit.

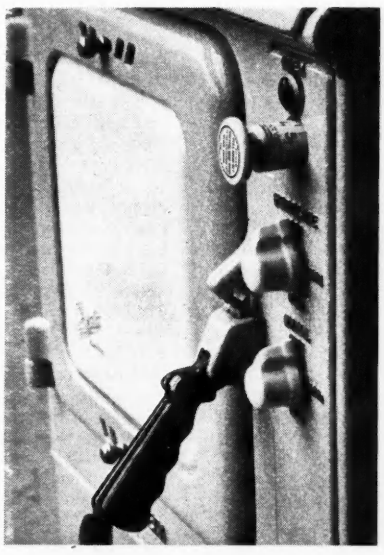
It is not our object to attempt to discuss such novelties as the combined cooker and fire or such details as the incorporated main switch; rather must we consider only those major ideas which so obviously wanted consolidating before the war. But we must first get certain facts relating to fundamental principles of cooking clearly in mind. Cooking by direct transference of heat from resistance elements has weathered the storm right from the beginning; cooking by inducing currents in foodstuffs and foodstuff containers did not get beyond the exhibition stage because of the cumbersome and complicated character of the equipment; storage cooking has seen little commercial development, but it has remained for many years as a potential ally of the load builder on account of its exceptionally high load factor. Because of its outstanding load characteristic we believe there is a future for the storage cooker which must, however, remain a delicate child for perhaps many years, because of its drawbacks of high initial cost and unorthodox, although proved, method of heat utilisation. Storage cooking must be nursed through its tender years until the industry is ready to adopt it.

We see, then, that the normal resistor cooker represents our development field for the time being and we must next ask: What are the divergent ideas concerning it which require co-ordination? We place them under three headings in order of importance—namely: the body, automatic temperature control, and hot-plate boiling speed.



We may one day see the popular cooker arise out of the present sheet metal "superior-finish" cooker

It has been fashionable for some interested in electric cooking to claim that because an electric cooker is a piece of *electrical* equipment it must necessarily be different in all ways from cookers employing other heating mediums. We admit that superficially this idea makes a ready appeal to the electrical mind; but does it not represent a trap? What dictates largely the size and shape of any cooker? It must have a certain food capacity; then it must be capable of being housed in dwellings in which it is required to function. Can the electrical industry for one moment ignore these two limiting considerations, and would it not be most advisable to recognise them as fundamentals? The last thing we recommend is that the electrical manufacturer should blindly follow designs more suited, perhaps, to equipment employing other heating media, but we do suggest that much advance will be made by recognising these limitations, enabling it to be seen more clearly how the entirely different problems of heat transmision, distribution and control can be tackled more efficiently.



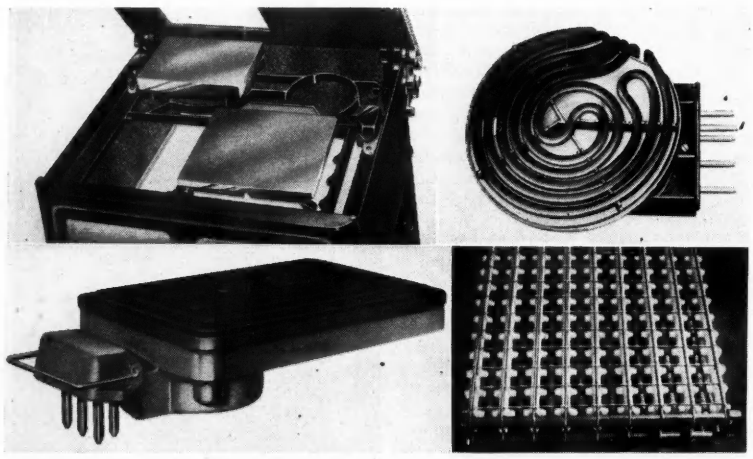
Experience has shown that no really drastic alteration in cooker design is necessary for automatic control

The horizontal or table-type cooker obviously has many advantages over the vertical equipment, but how few are the houses of to-day in which there is floor space to accommodate it! We must not forget the over-riding fact that the vast majority of cooker business is represented by the smaller houses of the artisan and the middle classes. Just before the war there appeared on the market a spate of what were termed "superior finish" cookers. They were mostly of sheet-steel construction. Apart from American and Colonial influence, the major reason, it appears, for their development was the greater opportunities for better finishes afforded by recent

advances in the technique of steel-pressing work, consequent upon the higher grades of steel becoming available.

In response to complaints from supply authorities regarding the high initial cost of cookers, manufacturers have for some years urged them to be content with something a little less sturdy than the generally accepted cast-iron equipment. Well, the sheet-steel cooker to which we have just referred would probably meet the requirement so far as construction is concerned; but it is more expensive. We believe, however, that the greater part of the extra cost of the "de-luxe" cooker is buried in the tool cost. But tool cost in any mass-production scheme can be cut drastically with large-scale production.

It seems fairly reasonable to assume, then, that with a certain degree of standardisation the overall cooker costs might easily be reduced to a point below those of the present cast-iron cooker, and from this it is a reasonable deduction that we may one day see the popular cooker arise out of the present sheet-metal "superior-finish" equipment. We are sure that the consumer himself will not raise any difficulty, and there are technical reasons why the sheet-metal equipment may be all the more acceptable. For instance, consequent on the fact that there is less metal to absorb heat, one might expect lower loadings. As much as 20 per cent. has been mentioned as a possible reduction figure in some responsible quarters. An interesting experiment with a cast-iron and a pressed-steel cooker, each with an oven measuring 14 in. by 15 in. by 12 in. and loaded at 2 kW, showed that the cast-iron equipment heated up to 400 deg. F. in 20 min., while the pressed-steel cooker reached the same temperature in only 14 min.



The scramble for position in the race for quick boiling seems to have led us to somewhere near the starting point: heavy solid, tubular, light solid and improved open hot-plates

We believe that manufacturers, in presenting this new "superior-finish" cooker, have in mind the possibility of the market for the hiring business becoming saturated, and the sheet-metal unit is therefore destined to open up further markets by way of direct sales and hire-purchase. It seems to be an excellent scheme to attempt to develop such fresh markets, but we cannot think of anything more damaging to the cooker business as a whole than to assume at this stage that the hiring business will soon be saturated. We believe that this is absolutely false because of the relatively small number of consumers who cook electrically.

The next set of ideas which need sorting out pertain to automatic temperature control. We believe that electrical men, let alone consumers, would get a better appreciation of the underlying meaning of automatic control if it were not for certain stupid publicity matter which has been thrown around so concrete a development. This suggests that the principal virtue of automatic control is that it will enable the housewife to go to the pictures more often. Actually the importance of the development lies in the fact that it will definitely extend the usefulness of the cooker. What is a cooker but a heat-treatment equipment? Is there one responsible electrical engineer who is not aware of the tremendous value of automatic control in increasing the value of the product in connection with any industrial heat-treatment process?

Automatic cooker control was first discouraged by some of the manufacturers who believed that its introduction would necessitate drastic alterations in design of cookers for the mass-production of which the existing factories had already been laid out. Experience has now shown that no appreciable alteration is really necessary, but, in any case, it seems extremely likely that when the ball of industry is started rolling again after the war most of the factories will then have to be rearranged. Some manufacturers are not the only ones who are retarding the development of automatic control, however, for many supply undertakings are still extremely nervous about the increased service charges and they have a sort of "black cooker" psychology.

An interesting repercussion of the automatic control development is the impetus it has given to the trend towards greater attention to heat-circulating arrangements in the oven. It is probably safe to say that the thermostat is directly responsible for the appreciation of the fact that satisfactory convection can only be obtained by proper attention to the disposition of the elements in relation to circulation. In saying this we have not the slightest intention of reopening the old controversy of side *versus* top and bottom heating. Since the housewife has taught us that cooking with different dispositions of elements is only a matter of adapting herself to the different characteristics of the cookers, we now have a better appreciation of the extent to which the production and development engineers depend upon the guidance of the cook for their own success.

What a rod he made for his own back who started the ramp of quicker hot-plate boiling, to meet gas-ring competition! But who did start it? We certainly know dozens of supply engineers who have held forth strongly on the matter at electrical meetings, dozens of manufacturers whose greatest desire seems to have been to make claims for speedy hot-plate operation in their publicity literature, and dozens of consumers, otherwise satisfied, whose first interest in the matter has been kindled by these electrical gentlemen rather than by their own experience. The scramble for position seems to have led us back to somewhere near the starting point, for from the satisfactory development of the solid plate over the period from, say, from 15 to 8 years ago, we have taken rather a tortuous path through development fields of different forms of radiant plate until immediately before the war we saw a revival of the original open-coil plate in, it is true, much improved construction.

Let us first find out if we really do want much speedier boiling, and that will help us to get down to a more reasonable development stability among the chaos of open plates, transformer plates, tubular sheathed plates, heavy solid plates, light solid plates, and so on. If speed is all that important, how can one possibly better the results obtained from a red-hot element proper in actual contact with the utensil? We know that the cost of the low-voltage transformer plate is about double that of other types of plates, but we strongly urge a broader view with regard to the cooker as a whole from the aspects of initial cost and simplification. If speedy boiling is not quite so important as we have pretended, but it is still necessary to speed up the solid plate, cannot we make up our minds as to which is the better method—higher loading or greater dissipation area? Increased loadings within a given space have certainly been troublesome in the past, and we feel justified in pointing to the success of the increased dissipation-area scheme in connection with water heating.

Is not heat control of greater importance than quick heating—beyond a certain datum, of course? For many years popular three-heat control seemed to give all-round satisfaction, but the introduction of a fourth and simmering heat immediately opened the door for all sorts of multiple-heat controls, culminating in an infinitely variable heating arrangement. Is it really necessary to go to this latter extreme, bearing in mind the outstanding advantages of simplification in construction? Maybe it is advisable, but we find fault with the idea of emulating for the hot-plate the infinitely variable control associated with the thermostat. This feature of the thermostat is nothing more than a peculiarity of its construction. The automatic device was introduced to give automatic temperature control only, without regard to any supposed call for an increase in the number of points of control.

Do we want to introduce automatic control for the hot plate? Our belief in the inimitable inherent qualities of electrical automatic control is based on what has been proved to be an extension of usefulness afforded by such control in connection with almost every type of industrial heat-treatment, and we are certain that the inevitable extension of usefulness of the oven will one day be passed on to the hob, but only from the consolidation of ideas which this article calls for.

TESTING INSULATORS

Substitution of Vacuum Glow-discharge for Water as Interior Electrode

By W. Subak

ONE of the usual methods of testing porcelain insulators constructed with hollow spaces and a single bottom is to fill the interior with water, which acts as an electrode for the puncture test voltage applied to the head and side of the insulator; metal bands or chains form the outer electrode.

Sometimes it is inadvisable to employ water because some moisture may remain. It is claimed that practical experiments have indicated that this risk may be avoided by utilising a vacuum glow discharge as an "electrode." But it must not be overlooked that the recorded break-down voltage includes that portion needed to sustain the glow discharge.

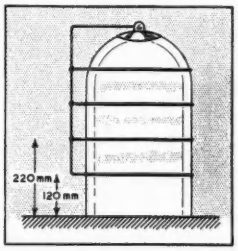


Fig. 1.—Glass globe with wire ring electrodes

For research with DC discharges a suitable instrument is a glass tube of about 40 mm. inside diameter with two flat electrodes on both ends which are fitted with rubber rings, thus making the tube airtight for connection with a vacuum pump. The pressure is reduced to 10 Torr (1 Torr is 1 mm. mercury column) and a variable direct voltage is applied through a resistance and an ammeter.

When the voltage is raised slowly and uniformly there is nothing to observe so long as the voltage is low. Actually current flows, but ordinary instruments cannot register it. At the ignition or puncture voltage, the current rises suddenly. When the resistance has been fixed at a certain value, the current which flows through the tube has a certain intensity, *i*. The voltage is divided into two parts, one along the tube the other one in the resistance, *i*. The portion of the voltage on the tube is the burning voltage, the tube giving light, different parts shining with greater or lesser intensity. Proceeding from the cathode one can observe the Crookes "dark room," then the negative glimlight, the larger Faraday "dark room" followed by the long positive column.

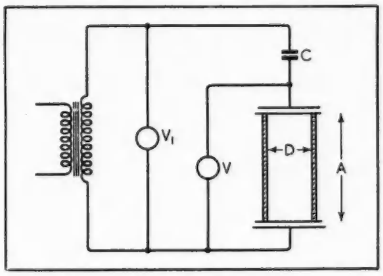


Fig. 2.—Circuit for determining ignition voltage

A.C. Discharges

Discharges of DC are less complicated than AC; for instance no theory has been elaborated for the column of AC which corresponds to the DC column. There are symptoms in AC discharges caused by the periodic change of tension. Both the current and the electric tension fall regularly to zero and alter their direction; thus the discharge must necessarily become ignited every time zero is passed. When a suitable position of the electrodes is provided one can observe uniform luminous glow discharge along the whole space of the tube, or the exhausted insulator. Tests made with rare gases at pressures of 1 to 20 Torr showed that the ignition tension varied from 350 V to 600 V AC. In the case of rarefied air it was higher. At the end of every half period the current fell to zero and altered its direction. Therefore at that moment there cannot be incitement by electrons and because the luminescence is only very short lived the gas column gives no light while the current passes zero. Even in the largest hollow spaces of insulators the electric tension required for ignition is only about 4 to 5 kV, whereas the alternating tension used for testing amounts to 50 to 150 kV. The dark period only covers a fraction of the half cycle. Therefore the hollow space appears to be glowing during the whole half cycle.

Photographs of DC and AC discharges show that the light effects of both are very similar. In general the ignition tension depends on: (1) Composition and pressure of the gas, (2) diameter, length and shape of the space where the discharge occurs, and (3) the electrodes.

Experiments with a Glass Globe

In order to investigate the propagation of the glow-discharge in larger hollow spaces, a glass globe was used similar to porcelain insulators. The disposition of the electrodes is shown in fig. 1. The globe had an inside space of 500×250 mm. and stood on a small earthed plate through which a tube led to a vacuum pump. On the other surface of the globe three or four wire rings were laid around at a distance of about 100 mm. apart and connected to rounded tinfoil which was pasted on the top of the globe. In principle the same disposition prevailed as that used for the testing of high voltage insulators. By lowering the pressure inside the globe to 4 to 6 Torr and applying voltage a glow discharge can be made to occur. In particular beneath the tinfoil at the top and in the planes of the wire rings the discharge is especially luminous, showing that the glim layer is lying close to the inner face as a conducting electrode.

A certain influence is exercised by the disposition of the wire rings. When, for instance, only three rings are fitted and the distance between the lowest ring and the plate is comparatively great at 220 mm. the strong gleaming layer in the planes of the wire rings and the "dark room" in front of the electrode may be observed. Although the outer electrodes are made only of thin wire rings, the glow discharge fills the whole distance between the rings. Now reducing the distance between the lowest ring and the plate to 120 mm., the "dark room" in front of the earth plate disappears almost entirely and the remaining space shines uniformly. I repeat that a glow discharge fed with AC may be used as a testing electrode for the entire space.

Ignition and Burning Voltages

In the testing disposition described above the electric tension is divided between the wall of the globe (or the insulator) and the glowing column. Because the voltage between the outer and inner faces of the wall is decisive for testing, one must know what share of the whole voltage is used to sustain the glow column. The walls of the globe are in fact a capacitance connected in series with the glow column.

Fig 2 illustrates a test arrangement that enables one to ascertain the ignition and burning voltages of the glow column, dependent on the distance of the electrodes for the usual measurements of the hollow spaces of insulators and even for greater distances. The experiments were made at pressures of 4 to 6 Torr, the same as used for the testing of insulators. The hollow spaces of a high-voltage insulator of 275 mm. inside diameter and of a steatite tube of 40 mm. inside diameter were employed. The distance between the electrodes was varied by means of movable metal plates for the entire length. The capacitance connected in series was about 200 cm. (1 centimetre = 1.11 micro-microfarads). Parallel connected to the glow discharge was an electrostatic voltmeter V which indicated directly the burning voltage, demonstrated in fig. 3 for the tubes of 40 mm. in. diameter and 275 mm. in. diameter.

The ignition voltage is identical with the sparking voltage of gases at low pressure, which is held to be a function of the product of gas pressure and distances between the electrodes, i.e., a function only of the whole gas quantity between the electrodes. For greater sparking distances and larger discharge spaces however that theory does not fit exactly, for as a result of tests made with neon gas the great influence of the diameter of the discharge vessel appears to be as shown in fig. 3, the curves indicating that for a greater diameter of the discharge space a lower voltage suffices. Porcelain insulators with double bottoms which are to be fused during the test seldom have a greater distance between the electrodes than 500 mm. because a total diameter of more than 1 m. is exceptional on account of manufacturing difficulties. The portion of the total voltage falling out for the burning voltage of the glow discharge is 2 to 3 kV maximum, but for insulators being tested at about 50 to 150 kV only a slight correction is necessary.

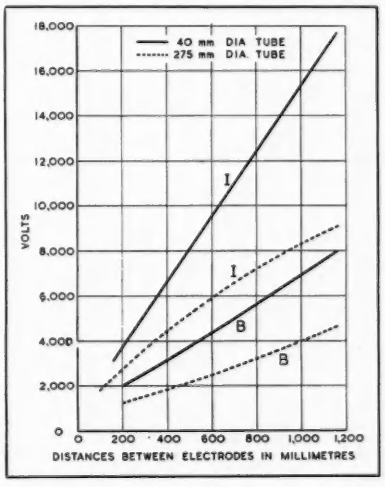


Fig. 3.—Voltage in relation to electrode distances
(I, ignition voltage; B, burning voltage)

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

"Daylight" Filters

WITH reference to your "Lighting in Wartime" issue, I am a little surprised to note that in the review of "Fittings for Industry" your writer says that a disadvantage of the use of filters is that "the absorption of light is exceedingly high, while the process eliminates practically all the red-yellow rays and produces a light which is definitely blue." Surely this will depend entirely on the colour and depth of the filters used, and if the filter is not too deep or too blue, there is no need for the resulting light to be blue, while if the filter is quite light the absorption cannot be very high.

The important point is: What is the object of the filter? If the object is to reproduce daylight, and if this is achieved, there cannot be too much blue, or too much of any colour, otherwise it would not be daylight. It will be found that the G.V.D. louvred unit mentioned in the review just before the passage quoted actually gives a very close approximation to daylight, and without any excessive absorption.

I have not yet found any fluorescent electric discharge lamp which does reproduce daylight, and, moreover, the G.V.D. unit in question is much more economical both to install and to run. Referring to the tinted reflectors mentioned, I trust that none of these profess to produce artificial daylight. If they do I should be very happy to see one.

There are, of course, various methods of attempting to reproduce daylight, including, for instance:—1. The additive method, in which two or more selected sources of different spectra are combined. 2. The absorptive method, involving a coloured reflector designed to absorb certain wavelengths and another reflector for throwing the light from the source on to the coloured reflector. 3. The subtractive method, in which the light from the source is passed through a filter or combination of filters designed so as to balance the spectrum.

Method 1 is very difficult to apply with any accuracy and still more difficult to maintain accurate owing to the different rates of depreciation of the various sources. Method 2 involves heavy loss by absorption and again some of the pigment deteriorates in time due to heat, dust, etc. Method 3 I have found to be unquestionably the most accurate, economical and lasting, the only appreciable deterioration being that of the bulb, which can be changed whenever necessary, and over which the makers of daylight fittings have no control unless they happen to be lamp manufacturers themselves.

London, W.C.2, *Sept. 7th.* G. V. DOWNER.

Air-raid Shelter Wiring

Mr. J. J. Lesser's article in your current issue forcibly reminds of my agitation twelve years ago on the need for compulsory registration. I can quite easily understand the death traps that are being laid in shelters by amateurs who are fitting them up electrically, and I quite expect to read of a number of deaths.

I fully agree with Mr. Lesser when he says "Very often these extensions are made without previous notification, etc.," and that is why I argued, years ago, that it ought to be a punishable offence for any unauthorised person to carry out work on installations supplied by the public authorities, most of which to-day are at 230 V AC or near and therefore can be too dangerous for the unskilled to play about with.

The question of the cheap, shoddy goods handled by some of the multiple stores which are used by many of these self-styled "electricians" will, I fear, never be settled until we have a National Proving House with powers to prevent any electrical goods or apparatus being offered to the public unless duly approved and certified.

The electrical contracting and retailing trade has run wild for some years and I fully anticipated when I started my original agitation in 1928 that some measure of protection would have been brought about before this time. It is not only those in the legitimate trade of contracting and retailing that I am concerned about but a vast British public of electricity users, who, in many other channels of trade, have had to be protected against themselves. If Mr. Lesser can do anything to prevent the dangers he has written about he will have the support of one who has tried hard to remedy things.

Bradford, *Sept. 10th.* HARRY MOSS.

Church Heating

I am a member of a committee appointed to consider and install a system to heat in a church 43 ft. long, 34 ft. wide and 18 ft. high with a flat roof. Some of the members favour gas, some hot water. Personally I favour electricity.

Could any of your readers give me any idea of the amount of electricity necessary and a suitable method which would assure an economical and an efficient method of heating?

I was very interested in your leader of May 10th, 1940, "Is Electricity Unpatriotic?" F. G. LEACH.

Wallingford, Berks, *September 5th*, 1940.

Testing Insulators (*Concluded from preceding page*)

High-voltage insulators, especially those for overhead lines, are often fitted with two bottoms. The upper one is always completely closed; the other has a small opening which is closed with glass after the baking of the insulator. In this process only local heating of a little sleeve is necessary, the insulator remaining cool while this is performed.

For testing their disruptive strength the inner space is exhausted to a pressure of 4 to 6 Torr. Several insulators may be tested at the same time and checked only by measurement of the inside air pressure. The outer electrodes are metal bands or chains laid around and an earthed wire electrode is introduced. For the walls the glow discharge is in fact the "earth electrode," the potential of which is 2 to 3 kV as described above.

The inner glow discharge can be checked by the appearance of the strong glide sparks and glow discharges on the outer walls of the insulator. Insulators tested simultaneously, one filled with water and the other by means of glow discharge and exhausted hollow space, both the same strong characteristics.

Further applications of this testing procedure are to porcelain cups of different shapes when the inner part is not accessible and to other insulating materials which cannot be tested by means of water or when the application of metallic plates may be difficult.

Gallantry and Efficiency

HIGH tribute to the work of civilian personnel of the Post Office during the period of the evacuation of the British Expeditionary Force was made by the Postmaster-General (Mr. W. S. Morrison) at a meeting on Tuesday last. He gave a number of details of the way in which they carried on communications under conditions of great stress and danger. All the resources of the Post Office were thrown into the battle to get more and more of the circuits working so that our armies might not lack vital communications in such a grave hour. Extraordinary expedients had to be adopted until the evacuation of Dunkirk had been completed, due to the need for maintaining communications with a headquarters which was more or less continuously on the move and could not give its next location in advance. Even so, had it not been for the fine co-operation of the Royal Corps of Signals in Belgium it would not have been possible to maintain these highly essential contacts.

American Mobile X-ray Unit for Britain

THE accompanying picture shows a mobile X-ray clinic which recently left the United States for use in Great Britain. Lady Lindsay, wife of Sir Ronald Lindsay, the British Ambassador, and Viscountess Knollys are seen inspecting the clinic. Mr. L. D. Canfield, vice-president and general manager, Westinghouse X-Ray Co., is explaining the equipment. The clinic is contained in an automobile trailer. The interior is divided into a lead-lined X-ray chamber 6 ft. square and a complete dark-room for developing and studying radiographic pictures. Special safety brakes and shock absorbers enable the trailer, drawn by a 1½-ton lorry, to travel over exceedingly bad roads at emergency speeds. In the dark room is an X-ray control board used to set the exposures, an electric film drier and water supply from a 100-gal. tank built into the trailer's rear. A miniature power station, one of the first ever constructed, uses the truck's own motor to build up the X-ray charges to as much as 90,000 V. This makes the unit completely self-contained. The new clinic is expected to permit X-ray photographing of hundreds of patients in remote parts of England where X-ray equipment is not ordinarily available. The trailer supplements twelve X-ray field laboratories previously shipped by the British War Relief Society. The entire electrical and X-ray installation was made by the Westinghouse Co.

Mobile X-ray clinic for the British Red Cross

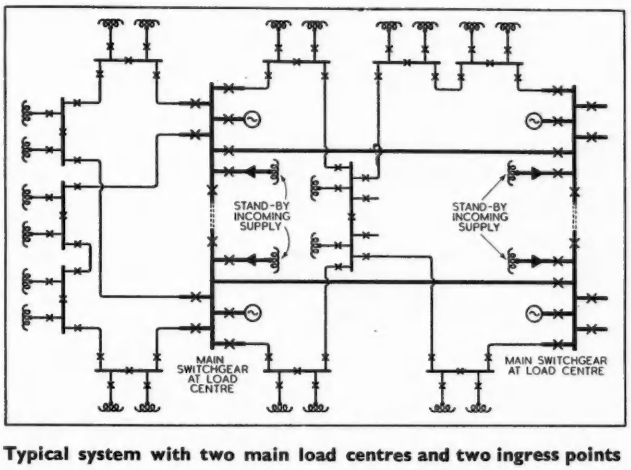
SWITCHGEAR LAYOUT

Special Arrangements to Meet War Conditions

By A. J. Nicholas, A.M.I.E.E.

THE problem of switchgear layout has received considerable attention during recent years and much has been done to deal with the inherent fire hazard by sectionalising the main switchgear on important supply systems. This has most commonly taken the form of fireproof division walls between adjacent sections of busbar, so that a fire breaking out in one group of switchgear is isolated and prevented from spreading; the damage and dislocation caused by many of the major switchgear breakdowns in the past would have been minimised had effective sectionalisation been adopted. The supply industry has recognised this aspect of switchgear layout, which I dealt with in the ELECTRICAL REVIEW of January 22nd, 1937, and fire sectionalisation is embodied in practically every new switchgear installation of importance.

Under war conditions the further hazard of enemy action is encountered, and the Government has adopted a general policy of dispersal in meeting it. Dispersal has as its fundamental principle the decentralisation of the means of production and defence, so that entire reliance is not placed on any one factory or unit. Electricity supply being the main source of power for our productive output, the same precautions are necessary, and the principle of dispersal must be applied to system and plant layout. It is now fully recognised that the most vital point in any system is the main switchgear busbars which are common to the local generating plant and to the grid supply of the Central Electricity Board, and it is essential that precautions shall be taken to ensure that a disaster does not cut off both these sources of supply which are fundamentally each a standby for the other.



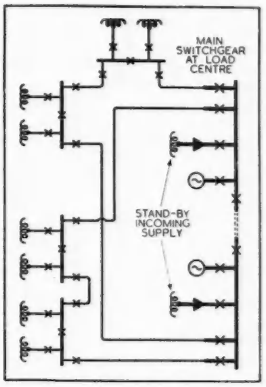
Typical system with two main load centres and two ingress points

Whilst the dispersal principle can be readily applied to industrial units generally, there are certain difficulties to be considered in its application to electrical systems on account of established load centres with which ingress points of standby power must coincide. There are in general two classes of power system :—(*a*) Systems covering large areas and having two or more major load centres. (*b*) Compact systems having highly concentrated load and a single major load centre.

In the case of (*a*) standby plant and connections can be arranged at more than one point; wherever possible two separate external supply tappings should be arranged at widely separated points on the system, so that in the event of enemy action causing damage to one tapping, the other would be unaffected.

The second class of system, having a highly concentrated load with a single load centre, is in the majority. Here the ingress point from the external supply is at the load centre and the main busbar and switchgear layout needs special attention to achieve a reduction in war hazard by dispersal. The provision of one switch house with internal sectionalising walls is inadequate for war conditions and two separate switch houses must be established, spaced as far apart as possible, each controlling a proportion of the generating plant and one of the external power supplies.

A number of installations employing two separated switch houses with busbars connected through interconnection cables and breakers have been put down on the dispersal principle and sufficient experience has now been gained from which to review the main essentials. The question is "How will the system function in the event of a switch house being destroyed?"—and with this in mind attention should be directed to the following :—Main busbars and switchgear; main cables; control gear and multicore cables; protective gear; and auxiliaries for switchgear operation.



Typical system with one main load centre and one ingress point

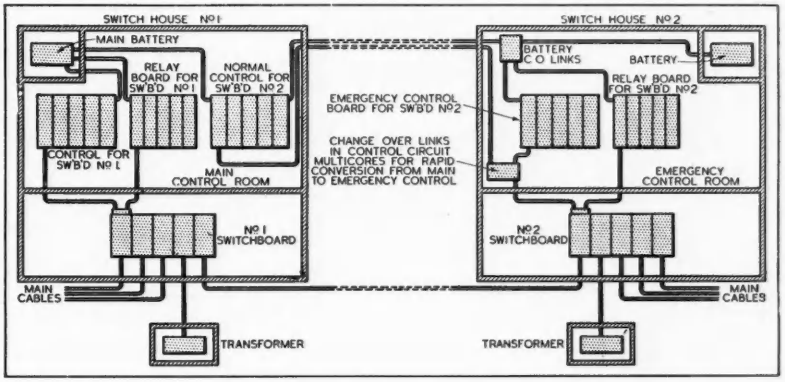
The main switchgear should be housed in two separate buildings spaced as far away from each other as site conditions permit. Most existing installations have the switchgear building forming part of the generating station building and in these cases the switchgear should be split up, leaving one part in the existing switch house and installing the other part in a new building situated away from the generating station.

One of the principal features brought out by recent discussions on switchgear sectionalising is the importance of the section or interconnector circuit-breakers. It is now realised that these breakers play a most important part in the switchgear layout and for a major installation busbar interconnector breakers should be arranged in both switch houses, so that, in the event of disaster to one, the faulty busbars can be cut off by means of an interconnector breaker located in the same building as the healthy switchgear.

This article does not deal with the detailed design of the building; recommendations are embodied in official memoranda, whilst the Electricity Commissioners' Report on Fire Risks at Generating Stations of March, 1938, deals with the precautions necessary inside each switch house for internal fire protection.

The principle of separation which applies to the main switchgear must equally apply to the main cables, and routes should be arranged so that cables from one switch house are kept away from the cables from the other switch house, and both should be entirely separate from control cables.

Under normal working conditions a central control point is necessary for maximum efficiency and the switchgear scheme should cater for this. The two usual arrangements are first where the control board for normal working conditions is located in the main switch house adjacent to the generating station, or alternatively where the control board is located at the generating station or system control room but the switchgear is in separate and remote buildings.

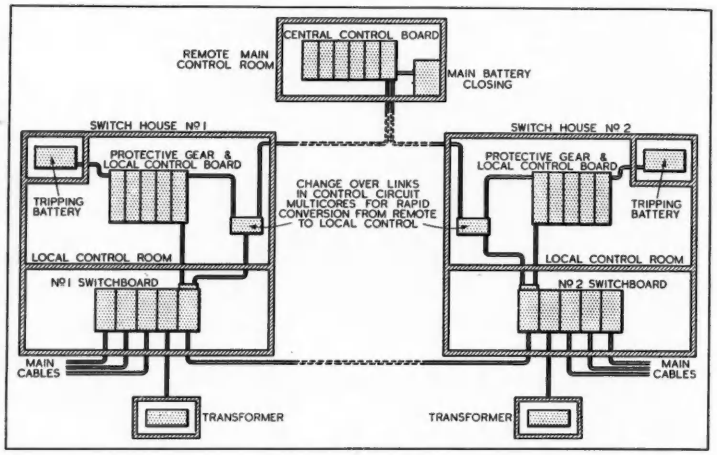

SWITCH HOUSE No 1
MAIN BATTERY
RELAY BOARD FOR SW'BD No 1
NORMAL CONTROL FOR SW'BD No 2
CONTROL FOR SW'BD No 1
MAIN CONTROL ROOM
No 1 SWITCHBOARD
MAIN CABLES
TRANSFORMER
SWITCH HOUSE No 2
BATTERY C O LINKS
BATTERY
RELAY BOARD FOR SW'BD No 2
EMERGENCY CONTROL BOARD FOR SW'BD No 2
CHANGE OVER LINKS IN CONTROL CIRCUIT MULTICORES FOR RAPID CONVERSION FROM MAIN TO EMERGENCY CONTROL
EMERGENCY CONTROL ROOM
No 2 SWITCHBOARD
MAIN CABLES
TRANSFORMER

Separate switch houses controlled normally from a main control room in switch house No. 1, with an emergency local control board in No. 2

A central control board is needed for normal operating conditions. The control room of a large generating station can be termed the nerve centre of that station and often of the entire associated system; it is recommended that this vital centre should be housed in a building designed to give the maximum of protection against war hazards. Each switch house must have its own emergency control in addition, which may be of a less elaborate character than that in the main control room. One of the chief features is that rapid facilities must be made for changing over from normal to local emergency control; this can be effectively done by installing change-over switches or removable links in the control and auxiliary supply cables at a convenient point adjacent to the emergency control board. The indicating instruments would be located on the main central control board and need not be duplicated for emergency control in the switch houses.

The protective gear should be located near the switchgear with which it is associated, the relay boards being housed in a separate room adjacent to the switchgear. This method makes the protective gear for each switch house self-contained and obviates duplication. A fault alarm and indication system is necessary to warn the operator at the central control board when relays have operated under fault conditions. For major installations busbar protective gear is recommended and here again the apparatus would be self-contained and housed adjacent to the switchgear which it protects.

The provision of adequate auxiliary supplies is essential to the working of any scheme of duplication. For electrically-operated gear two separate batteries for breaker operation are advisable, and if these are located in separate buildings, they can be installed to suit site conditions, provided that in the event of one battery being destroyed, the supply from the other can be taken to the switchgear. Often one main battery only is available and it is situated near the main control board; in such cases the battery should be used for closing only and the standby provided by emergency hand closing in the switch rooms. It is necessary, however, to have two sources of supply for tripping to keep the protective gear in commission and small tripping batteries should be used in each switch house. There are many possible arrangements of auxiliary supplies, the fundamental requirement being that an operating supply must still be available in the event of any one source being put out of action.



Separate switch houses controlled normally from a remote central control room with means for changing over to local control in emergency

While new installations are being satisfactorily dealt with, it should be realised that many existing installations could be reconstructed in a manner similar to those just described. In these days we very rightly strive after economy in plant, but it is urged that these matters be viewed in the right perspective, and due consideration be given to the special problems of switchgear layout at our main load centres, as this, in governing largely the effectiveness of standby supplies, will play an important part in maintaining the country's ever-growing war production.

Statistics and the Engineer

Analysis of Test Data

A PAPER by Dr. B. P. Dudding and Mr. W. J. Jennett (of the G.E.C., Ltd., Research Laboratories) has been published in the *Journal* of the Institution of Electrical Engineers entitled "Statistics and Engineering Practice." The intention of the authors is to help engineers handling data influenced by a multiplicity of causes to decide, from samples drawn at random, what conclusions can reasonably be drawn as to the character of the bulk.

A brief explanation is given of the Gaussian distribution, which is defined by the value of the mean and the standard deviation. The latter is the root mean square of all the deviations of the individual values from the mean value and is thus analogous to the RMS value of an alternating current. When a mean value and a standard deviation are associated with a large amount of data they are usually represented by the symbols X and σ but when associated with samples by $\bar{x}$ and s. The standard deviation is sometimes expressed as a percentage of the mean and is then known as the "coefficient of variation."

For the Gaussian distribution, tables have been published giving the area of the curve lying outside various deviations from the mean expressed as multiples of the standard deviation and known as "standardised deviations." If the mean value and standard deviation are known or can be inferred, the expected proportion of individuals within any desired range of the scale of measurement can be estimated. Experience shows that where reasonable care is taken to control the processes of manufacture and measurement there is a marked tendency for the distribution of observations to approach the Gaussian form. Some of the theoretical relationships so derived can be safely used in approaching practical problems if in the early stages attention is concentrated on average results derived from small samples rather than on individual values.

Control charts due to Shewhart, on which routine test data are plotted against limits, form the best introduction to the application of statistical principles to industrial problems. In their simplest form some measured quantity of a manufactured article is assumed to be represented by a frequency distribution similar to that already referred to and that this distribution is fixed when the industrial processes are under normal conditions of control. If the limits of three times the standard deviation be placed on each side of the central value, observations outside their limits should rarely occur. When they do it suggests some lack of control of materials or processes.

The association of a value of probability with limiting values displaced from the average value by a multiple of the standard deviation depends on the distribution of values approaching some established form. When using statistical technique for the first time it is advisable to deal with variation among average results for samples of, say, from five to ten individuals. Irrespective of the form in which individuals are distributed, the standard deviation of the mean values of samples containing n individuals is given by $\sigma\sqrt{n}$. Thus if the data under consideration are the average results derived from tests containing four or nine individuals, their standard deviations will be one-half or one-third of the standard deviation of the individual results. Further, the average value of all the sample means will approximate to the average value of the individuals in the bulk. Standard multipliers can be used to calculate limits within which the means of samples may be expected to fall provided the bulk from which they are drawn has a specified mean value and standard deviation. The means of samples of n individuals selected from a bulk with a mean value $\overline{X}$ and standard deviation σ will fall, for example, 19 out of 20 times between limits $\overline{X} \pm 1.96\ \sigma/\sqrt{n}$ or 499 out of 500 times between limits $\overline{X} \pm 3.09\ \sigma/\sqrt{n}$.

The values of the mean results of samples relative to such limits will indicate whether the samples are likely to have come from bulks whose quality values are consistent with those on which the limits are based. If data for samples are consistent with the limits the quality of the product is said to be controlled, such limits being termed "control limits" and the graphical representation a "control chart." At the end of the paper it is indicated that extensions to the analysis of variance involving correlation and regression are useful aids in testing and research. The authors emphasise that the efficient use of the statistical tool can come only by practice and that in no sense can it be substituted for sound technical knowledge with which in all problems it must be combined.

Technical knowledge of the manufacturing processes is required to suggest the origin of variability exhibited by the product sampled, which is assumed throughout to arise from a system of chance causes. Lack of statistical consistency in the results indicates the existence of variability external to the system of chance causes.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

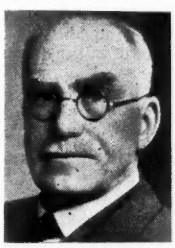
THE following new governors of the Electrical Industries Benevolent Association have been appointed this year on the nomination of various companies, who have contributed sums of £100 to its funds as follows.—On the nomination of the North-Eastern Electric Supply Co., Ltd., Mr. A. Bonnin, Lt.-Col. Sir Cuthbert Headlam, Bart., D.S.O., M.P., Mr. N. Merz, Mr. G. Stirling Newall, D.L., J.P., and Mr. W. H. Ord. On the nomination of the English Electric Co., Ltd., Mr. G. H. Nelson, M.I.E.E., M.I.Mech.E. On the nomination of Siemens-Schuckert (Great Britain), Ltd., Baron P. Graevenitsz.

Mr. R. S. Bennett, A.M.I.E.E., M.A.I.E.E., has been appointed chief electrical engineer to Thomas Firth & John Brown, Ltd., of Sheffield.

Mr. J. McAlpine Owen, Peterborough District telephone manager, has been appointed manager of the Manchester District. Mr. Owen went to Peterborough nearly six years ago to be sectional engineer in the Peterborough section of the Nottingham Telephone District. When the new Peterborough district was formed, with an area extending from Skegness to beyond St. Neots, Mr. Owen was appointed the first manager.

On his retirement on August 30th after forty-eight years' service **Mr. E. Wilmott,** press shop foreman of **J. H. Tucker & Co., Ltd.,** was presented with a wallet, Berkeley chair and gold pencil case from the directors, staff and workpeople. **Mr. J. B. Tucker,** managing director, who made the presentation, said that Mr. Wilmott was the first foreman in the service of the company on its inception in 1892, and was also associated with the founder, the late Mr. J. H. Tucker, over half a century ago, when they were both with Veritys, Ltd.

The report of the Sydney County Council Electricity Department for the past year, a resumé of which appears elsewhere in this issue, contains a full-page portrait of **Mr. H. R. Forbes Mackay,** M.I.E. (Aust.) who retired from the position of general manager on October 6th last. Appreciation of the valuable services of Mr. Mackay is placed on record in a resolution of the Council which points to the remarkable growth of the undertaking during the 31 years of his management. During that time the number of consumers rose from 2,220 to 250,360 and the area of supply, direct and in bulk, was extended from 6 to 897 square miles, with an increase in the staff from 175 to 3,266. In 1936 Mr. Mackay was presented with the Peter Nicol Russell Memorial Medal, the highest honour bestowed by the Australian Institution of Engineers and awarded each year to a member who has made a notable contribution to the science and practice of engineering in Australia.



Mr. H. R. Forbes Mackay

Mr. W. Baker, who has retired on superannuation as head of the installation dept. of Burnley Corporation electricity undertaking, has been presented with a radio set by his colleagues. Mr. Baker was the second oldest employee in the service of the undertaking, with which he has been for thirty-nine years.

Mr. E. L. Landucci, administrative officer of the West Midlands Joint Electricity Authority, was married recently to **Miss E. Haigh,** a member of the staff of the Authority.

Mr. P. C. Cavanagh, secretary of the Southend, Westcliff and District Chamber of Trade, has been appointed assistant to Mr. L. C. Penwill, director and secretary of the Electrical Contractors' Association. Mr. Cavanagh, who takes up his new appointment on September 30th, has been secretary of the Southend Chamber since 1927, and was previously with a firm of auctioneers and surveyors.

The Postmaster-General has appointed **Mr. J. Innes,** B.Sc., M.I.E.E., Principal Assistant Secretary, to be Director of Telecommunications in succession to **Mr. F. W. Phillips,** C.M.G., who retired on September 6th. Mr. Innes has also been appointed a member of the Post Office Board.

Mr. Innes, who is fifty-one, was educated at the Royal High School and Heriot Watt College, Edinburgh, and after training as a civil engineer entered the Post Office Engineering Department in 1913. For most of his earlier years of service he was engaged on telegraph and telephone engineering in the field, including a period of service on communications required by the Admiralty during the last war. Subsequently he returned to Edinburgh where he took charge of the work of converting the telephone system to automatic working. In 1929 he was lent to the South African Government as an adviser on automatic telephone systems and was responsible for the installations at Johannesburg and the Cape Peninsula. He visited the United States in 1933 as a member of a special mission on communications and has visited Germany and Poland in a similar capacity. As staff engineer and Assistant Engineer-in-Chief, he was employed at engineering headquarters on problems affecting the development of the British telephone system, and in 1936 he was transferred to administrative duties as Assistant Secretary. Since that time Mr. Innes has been responsible for the administration of the telephone service in this country, and in 1939 became a Principal Assistant Secretary when the war activities of the Post Office on communications were greatly increased and were placed under his charge. He will continue in charge of these functions in his new capacity.

Mr. J. Innes

The retirement of **Mr. G. Broadhurst,** A.M.I.E.E., electrical engineer to the Clacton Urban District Council, was marked by a farewell party at the Osborne Hotel on September 4th, organised by the Electricity Department staff. Under the supervision of Mr. and Mrs. Newcombe Burgess a supper was served to forty members of the staff and their wives. Councillor H. P. King, chairman of the Electricity Committee, congratulated Mr. Broadhurst on the results of his twenty-one years' service with the Council. Mr. S. N. Boyne, the newly appointed electrical engineer, presented gifts to Mr. and Mrs. Broadhurst on behalf of the members of the Electricity Department and Town Hall staffs.

Mr. W. G. Murrin, president of the British Columbia Electric Railway Co., was recently appointed to the board of governors of the University of British Columbia.

Mr. W. J. Evans, rolling stock and overhead line engineer with the Rotherham Corporation, has been appointed chief engineer of the Cardiff Corporation transport services at a salary of £800 per annum. Mr. Evans served as chief assistant engineer in various departments of the General Electric Co., Ltd., from 1923 to 1935 and he has had experience in installing, testing and maintaining motor-buses, trolley-buses and tramcars at Rotherham, Birmingham and Rochdale.

Obituary

Mr. J. Hardy Parsons.—We regret to learn of the death of Mr. J. Hardy Parsons, managing director of Gent & Co. Mr. Parsons joined the company in 1884 as an apprentice.

Mr. L. A. Hards.—The death is reported of Mr. Leo Arthur Hards, who from 1907 to 1934 was manager and engineer of the Cornwall Electric Power Co., Ltd., Carn Brea. He relinquished that position owing to ill-health.

Lieut. J. P. Higham.—We regret to hear that official notification has just been received that Lieut. John Percival Higham, the elder son of Mr. and Mrs. H. Higham, of Sandy Mount, Robin Hood Lane, Helsby, who was reported missing, is now "missing believed killed." Lieut. Higham was before the war the technical representative at Sheffield of British Insulated Cables, Ltd. He was thirty-three years of age.

Power Costs in Adelaide

TO provide manufacturers who are contemplating establishing factories in Australia with information regarding the availability and cost of power in its area, the Adelaide Electric Supply Co., Ltd., has issued a booklet setting out details of its service. In a foreword the Premier of South Australia contends that greater possibilities exist for the establishment of new and expanding secondary industries in this than in any other State of the Commonwealth.

Because of the absence of workable coal deposits and water power it may be thought that electricity would be somewhat costly in Adelaide. For certain classes of user—notably domestic and small lighting consumers—the price is higher than in Melbourne and Sydney because the district is not so densely populated, but for industrial power the charges compare favourable with those in the larger capital cities. A tabular comparison of the power costs in the three cities indicates that for a factory operating one eight-hour shift per day, with an average load of 120 HP and a monthly consumption of 20,000 kWh, the price in Adelaide would be 0.95d., scaling down to 0.78d. for an average load of 2,100 HP and a consumption of 350,000 kWh. Corresponding figures for Melbourne are given as 0.98d. to 0.75d. In Sydney the price would be about 0.83d. to 0.9d., according to the actual HP connected. Similar figures are given for a factory working three shifts a day, for which the prices in the three cities are stated to be 0.72d. to 0.66d.; 0.70d. to 0.59d.; and 6.62d.

As proof of the advantageous terms offered by the company, it is pointed out that with very few exceptions the whole of the industrial concerns operating in the Adelaide metropolitan area have their power and lighting requirements supplied exclusively by the company. The industries cover a wide range and include the production of flour, fertilisers, cement, chemicals, motor bodies, steel tubes, armour-plate glass, bottles, furniture and bricks, as well as ice and cold storage, printing, clothing and general engineering.

The company supplies an area of over 100 square miles, its system being 415 V, three-phase, 50 cycles, four-wire, the same as in Melbourne and Sydney. The present capacity of its power plant is 80,000 HP. For the year ended August, 1939, the gross revenue was £1,064,905, the number of consumers connected at the end of the period being 102,015, an increase of 3,752 during the twelve months. The maximum load was 41,280 kW, and altogether 139.8 million kWh was sold. The managing director is Mr. F. W. Wheadon, and the London office is at 27-28, Finsbury Square, E.C.2.

UNIFORM TARIFFS

Are They Commercially and Economically Practicable?

By H. Southall

RECENT expressions of support for the idea of nationally uniform tariffs from within the electricity supply industry are disturbing, for such a step would involve many commercial problems, and it has yet to be proved that there is a definite wish for this change on the part of the consumers themselves.

During a period covering more than twenty years I have frequently been asked why electricity in the Borough of A is dearer or cheaper than in the City of B, but not one consumer has ever asked why charges throughout the country cannot be made uniform or standardised. The reason for the first question is obvious; most consumers like occasionally to think they have grounds for a grumble, but often enough they know so little about tariffs that they are unable to make fair comparisons. This points to a lack of facilities enabling consumers to understand how much and for what they are really paying.

It is not difficult to comprehend why consumers do not query the absence of uniformity in electricity charges. They do not expect it, because there is also a complete lack of equality in the charges for gas and water throughout the country, and electricity bills fall in precisely the same category as gas and water bills from the householder's point of view. Incidentally, water is a much more suitable subject than electricity for the application of a national standard charge.

Recently an engineer of long standing in the electrical industry suggested that electricity should be made available to everyone who required it, and he went so far as to say that a single house, isolated from all others, should be served even though the laying of a mile of mains was necessary. (He is not a cable salesman.) When asked what would be the attitude of the Post Office towards giving a telephone service in similar circumstances he remarked that the Post Office would at any rate deliver letters to residences a mile away from any others at the standard charge. The obvious answer was given that no specific capital outlay would be expended by the Post Office in delivering the letters to such a house.

Variations in Capital Costs

Capital costs represent the most formidable item in the production and distribution of electricity and must necessarily form the major factor in ascertaining the proper selling price. There are many circumstances which affect the capital cost per head of the population served and per kW of maximum load, such as density of the area supplied, overhead or underground mains, proportion of consumers served to premises, ratio of various classes of load to total load, and managerial ability.

It is difficult, however, to account for the great difference shown between the maximum and minimum capital costs of distribution per kW of maximum load for comparable towns even after allowing for the circumstances mentioned. These are ascertainable from the Annual Return of the Electricity Commissioners and revelations await those prepared to ponder over the figures. From a study of these capital costs the conclusion may be formed that any scheme for the general unification of tariffs should be accompanied by "pooling" of capital commitments. Alternatively to "pooling," a system of subsidisation could perhaps be devised whereby those who reduced their prices to conform with the standard tariffs would be helped by those who increased their tariffs to the new levels. The praise from those deriving benefit, however, would be drowned by the vigorous protests of those who would suffer, and as a small army of accountants would be needed to operate the scheme, their salaries, together with other resultant overhead costs, might remove the grounds for praise entirely.

Uniformity of tariffs could operate unfairly towards those towns which have paid salaries befitting the management of their electricity undertakings, and it is doubtful whether those which have underpaid their officials would divert any of the additional revenue—assuming it materialised from increasing their charges to the standard—into a deserving channel.

Local rates now form an important part of the overhead charges. Few undertakings escape lightly in this direction, some fare moderately, but many are heavily laden. Presumably this fantastic lack of uniformity would require alteration before serious attempts could be made to unify the selling prices of electricity.

Rates of wages also have a bearing on the question. So far it has been found impracticable or undesirable to standardise wages in the supply industry, and there can be no doubt that if it became necessary to permit standardisation of selling prices, the movement would be upwards.

Substantial changes in local conditions such as depression of staple industries, transfers of large works, strikes and amalgamations between undertakings, &c., have their influences on electricity supply authorities. Large power supplies have in the past descended on some undertakings like manna from heaven. Under a system of standardised charges new loads of this character could have a disturbing effect. Suitable rates of charge may be fixed for the new power supplies, but the addition of the load to the existing load of the undertaking concerned could upset balance of the remaining tariffs.

Assuming it to be possible to unify selling prices by a process of gradual adjustments over a period of years, the financial position in some areas could be rocked, if not wrecked, by clinging to standard tariffs. The past remedy of tariff "juggling" to cater for changed circumstances and the attraction of business to a lagging branch of the supply would be missed and large surpluses or heavy deficits might result.

Another "pool" would appear to be required into and from which undertakings would pay or draw funds to equalise their finances. With standardised tariffs, pooled capital commitments, pooled revenue, equalised (local) rates, standard wages, and perhaps uniform coal prices, the socialisation of electricity supply would be almost accomplished. It is difficult to imagine what would be gained, but the industry would be likely to lose heavily from the loss of incentive to improve load-factors and increase sales to balance annual budgets. The loss of these two essentials in economic trading would prove a severe handicap in a struggle with an unfettered gas industry

Incentive to Progress

Electricity supply in this country has grown at a faster rate than is sometimes recognised; it has almost reached the magnitude of gas supply in one-third of the time. There are sound reasons why economic electricity supply is dependent to an extent upon competition between undertakings themselves for the top places in the published tables of data and between other forms of light, heat and power. The publication of tables showing the comparative costs and other factors of all undertakings has created a healthy form of rivalry which has been of considerable benefit in cheapening production and distribution.

Several important industries have been afflicted by grandiose schemes on national lines which have had for their object the rationalisation of those particular industries and for their effect, a form of economic paralysis. If standardised, unified or nationalised tariffs mean all that they imply it would almost seem that suggestions in this direction emanate from sources which are antipathetic to the industry generally.

Few of the existing tariffs can be described as bad; usually the fault lies in their application and the manner in which they are placed before the consumers. Until someone can put forward reasons which justify the adoption of uniform tariffs, those concerned would perhaps be better employed in making the best of the tariffs now existing instead of allowing their thoughts and energies to be diverted from the main task of serving the public well with cheaper and still cheaper electricity.

Hospital Kitchen a "Factory"

IT was decided by Mr. Justice Tucker in the King's Bench Division on September 5th that the kitchen of a hospital was a "factory" within the meaning of the Factories Act, 1937.

The matter arose out of an action for damages brought against the London County Council by Miss Marjory Wood, a kitchenmaid at Bexley Mental Hospital. Miss Wood was using an electrically operated mincing machine when her right hand was caught in the machine and seriously injured. She claimed damages on the ground that the Council was negligent in failing to fence the machine as required by Section 14 of the Act.

The L.C.C. denied negligence on the part of themselves or their servants and pleaded contributory negligence by the plaintiff.

In the course of his judgment, Mr. Justice Tucker said that Section 151, Sub-section 1 of the Act defined a factory as a place in which persons were employed in manual labour on processes for, or incidental to, the making or alteration of any article, being a place in which the work was carried on by way of trade or purposes of gain. Sub-section 9 of the Act provided that premises belonging to a public authority should not be exempt from this definition because the work was not carried on by way of trade or for purposes of gain.

Therefore to decide whether the kitchen was a "factory" it was necessary to revert to Section 151, Sub-section 1. He could not agree that meat which was being dealt with by the machine was not an "article," as had been contended by the defendants, and he came to the conclusion that the kitchen came within the scope of the Act. The machine in question was not securely fenced as the Act required, but he found that Miss Wood had been guilty of contributory negligence and judgment would be entered for the L.C.C.

NEW ELECTRICAL PRODUCTS

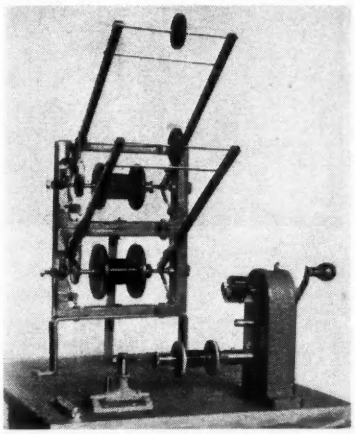
A Review of Equipment Recently Marketed

Cable Sockets for Emergency Work

THE design of the latest clamp cable sockets introduced by W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Milton Court, Westcott, Dorking, Surrey, is a further contribution toward rapid and efficient jointing. They will be particularly useful in emergency work, and are made from high-grade tinned brass, being of a design similar to the universal clamp connector. The reversible cap permits clamping of various size conductors so that, with the two available sizes of clamp sockets, conductors from 0.0225 to 0.20 sq. in. can be accommodated. A tapered hole is provided in the palm and this can be reamered out if a larger bolt is to be used.

Coil-winding Take-off Stand

A take-off stand to hold bobbins for feeding wire to coil-winding machines designed by FRANK WHITELEGG, 90, Robinhood Lane, Sutton, Surrey, is suitable for use with any machine, although illustrated in conjunction with his hand-driven model.



Take-off stand for bobbins feeding coil winding machine

The stand is built up in unit-constructional manner so that it can be supplied for one wire only, or units can be mounted above each other for feeding several wires at once. The bottom unit is mounted on a bracket to raise it above the bench and the two-unit stand is fitted with a strut at the back to prevent vibration. This stand is suitable for feeding wire from the finest up to about 25 SWG. Tension is applied to the wire by two springs which can be finely adjusted. A steel band brake prevents any over-run of the wire and the rising lead-over arms obviate slackness when the pull ceases.

Two-way Communication System

There are many possible uses for the "Callboy" two-way communicator made by EASCO ELECTRICAL SERVICE, 1, Brixton Road, London, S.W.9, such as staff locating or issuing instructions, and acknowledgments are received without the speakers having to leave their seats or cease work. There is sufficient valve amplification for speech to be picked up within 25 ft. of the small microphone speakers, up to six of which may be connected to the master control instrument, which can be energised from AC or DC mains without alteration.

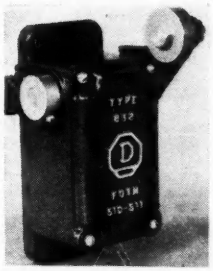
Easco "Callboy" sound communicator suitable for A.R.P. warnings

The instruments are finished in black leather cloth, the master being 13¼ in. by 10½ in. by 7½ in. wide and weighing 11½ lb., while the microphone-speakers are 7 in. by 7 in. by 4 in. wide and weigh 3¼ lb.

The outfit may be employed as a watchman's listening post and also for A.R.P. sound warnings, enabling work to be carried on until the staff is informed that danger is near, with the aid of a receptor on the roof so that there is no need continuously to man the look-out post.

Ironclad Limit Switch

An ironclad limit switch of extra robust design for use in control circuits is made by the DONOVAN ELECTRICAL CO., LTD., 46, Great Charles Street, Birmingham, 3, suitable for frequent service in dirty situations.



Robust limit switch for frequent service in dirty situations

The standard enclosure is splash-proof and the single-pole mechanism can be altered on site without tools to enable it to be employed in circuits arranged to function in either the normally open or normally closed positions. Similarly the operating lever can be put on either the right or left side of the housing case.

Refrigerator Control Panel

A control panel, made by the same company, which should appeal to manufacturers of refrigeration machinery, is designed to start a slip-ring motor driving the compressor in interlocked sequence with four direct-switching starters in the same case for the pump and brine motors. For each machine there is provided an "auto-off-hand" lever switch in front of the controller case, while the resistor is placed at the top of the panel for accessibility and the back is removable to enable all parts to be reached. The panel stands on four short legs intended to be fixed to the floor.

Life-light for Seamen

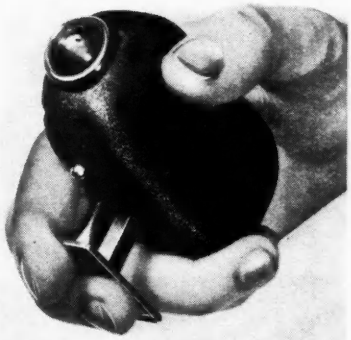
What is described as a "jacket life-light," intended for use by mercantile seamen and said to have the approval of the Ministry of Shipping, is obtainable from the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.

It is made in two parts which are wired together by a rubber-covered twin flexible lanyard. The water-tight tubular metal battery container is 3 in. long and 1½ in. in diameter, weighing 4¾ oz. with battery. The other portion is 5¾ in. long and 1¼ in. in diameter, weighing 3½ oz. It is made of cedar wood and fitted with an "Osram" bulb, protected by a red transparent moulded dome, complete with switch and covering cap.

It is not affected by immersion even if the red dome is lost or broken, provided the bulb itself remains intact, the only action necessary on the part of the user being to break the seal by twisting and removing the metal covering cap, which is normally sealed in position to protect the life-light against misuse. The bulb and battery can be tested, however, by pushing a match or pencil point through a small hole in the cap provided for this purpose in order to operate the automatic switch. When this cap has been removed for action the life-light will float alongside the user at the end of the wire flex lanyard. Alternatively, it can be held in the hand when the switch can be used for signalling or to turn the light off permanently.

"Everlasting" Flashlight

The new "Zedalite" just marketed by Z ELECTRIC LAMP & SUPPLIES CO., LTD., 21, Newman Street, W.1, is a compact little torch measuring only 4 in. by 1 in. by 1⅛ in. and weighing 9 oz., and incorporating a dynamo operated by gentle pressure of the fingers on a lever. The only component likely to require replacement is the 2.5 V lamp, the torch carrying a year's guarantee against defective materials and workmanship. It has an attractive streamlined black metal case.



The "Zedalite"

Rising Sheffield Output

LAST year saw a further appreciable increase in the output of the Sheffield Electricity Department. The report of Mr. J. R. Struthers, general manager and engineer, shows that during the year ended March 31st last altogether 630.0 million kWh was sold compared with 552.1 million kWh in the previous year, an improvement of 77.9 million kWh, or 14 per cent. Although the quantity of electricity generated and purchased increased from 763.0 million to 833.5 million kWh there was a large reduction in energy used in transmission—from 45.4 million to 39.5 million kWh. An additional 3,087 consumers were obtained, making the total number 164,094. Mains were extended by 48 miles to an aggregate of 2,466 miles, and the total load connected rose by 18,519 kW to 568,249 kW. During the year 330 new slot meter (assisted wiring) installations were carried out under the scheme adopted by the Council in 1925 and through which 59,213 consumers have now been connected.

The report includes a number of interesting progress charts, one of which illustrates the steady fall in the average price obtained, which last year reached the very low figure of 0.576d.; this compares with 0.615d. in the previous year. There was also a reduction in the total cost per kWh sold from 0.558d. to 0.535d., working costs falling from 0.393d. to 0.374d. and capital charges, &c., from 0.164d. to 0.161d.

The total revenue of the Department was £1,600,077 (including £80,005 from the motor and installation section) against £1,497,360 in the previous year. Working costs amounted to £1,043,972 as compared with £928,353 in 1938-39, and an analysis of these shows that there was a large increase in local rates, from £76,229 to £97,336. Out of the gross profit of £556,105 loan charges amounting to £421,987 (£378,969) and income tax provision of £27.649 (£58 481) have been met, leaving £106,468 (£131,557). Of this £56,938 is allocated for meters, transformers, wiring for apparatus on hire, &c., and £49,531 is transferred to the reserve fund which has, however, been drawn upon for A.R.P. expenditure and additional amounts paid to Rotherham and the C.E.B. (1933-36); the balance is now £579,292 against £615,205 a year ago.

COMMERCIAL and INDUSTRIAL NEWS

Skilled Labour for Export Trade. New Lamp Publicity. Price Control

British Trade with South America

TWO representatives of the United Kingdom Commercial Corporation are to sail shortly for Argentina with the object of setting up an organisation to facilitate the important trade between the United Kingdom and South America.

To supplement the normal deliveries of British goods to South American markets, the President of the Board of Trade, acting on the recommendation of the Export Council, has authorised the Corporation to take the necessary steps to facilitate the holding in South America of adequate stocks of United Kingdom goods which South America requires. As rapidly as conditions permit the United Kingdom Commercial Corporation will endeavour to create in other South American countries organisations similar to that to be set up in Argentina. The Corporation will not itself trade but will use existing trade channels in opening up new ones.

South America's need for British goods is increased by the inability, thanks to British sea power, of Germany, Italy and the countries occupied by German forces, to deliver products which they formerly shipped overseas. About a million tons of shipping is at present employed in trade between South America and the United Kingdom. It is believed that the arrangements now being made will lead to considerable trade expansion.

Maintaining Our Export Trade

The Board of Trade has issued a statement in which it emphasises the Government's view that workers in export trades are engaged in work of essential national importance. This states that the President of the Board of Trade and the Minister of Labour and National Service have given joint consideration to the problem presented by the need for maintaining an adequate supply of skilled labour for the essential branches of the export trade, while at the same time enabling the insistent demands of munitions production for such labour to be met.

Both Ministers desire to emphasise the fact that one of the main "bottlenecks" in the production of munitions of war is skilled labour.

All producers of munitions are continually being pressed to adopt measures for effecting the utmost economy in the use of skilled labour so as either to reduce their demands for such labour or to set it free for employment elsewhere. It is essential that exporting firms should apply the same principles to the full, and it is the duty of the Labour Supply Inspectors of the Ministry of Labour to ensure that this is done.

Inspectors of Labour Supply have been instructed to secure the agreement of the employer wherever possible before taking any particular employee away from him. It has been laid down that both the employer and the employee shall have at least four days' notice, during which either party may make representations against the proposed transfer. When agreement has not been reached the employer, if he is engaged in the export trade, should make his representations to the Board of Trade representative on the appropriate Area Board, who will consult the Divisional Controller of the Ministry of Labour and National Service.

It is the desire of both Ministers that there shall be as little disturbance as possible to skilled labour which is essential to the export trade. It must, however, be realised that occasions may arise when the demands for labour for munitions of war must take precedence of all others, and in such cases the Board of Trade representative may not be able to secure any concession. Instructions in the above sense are being issued to the officials of the Ministry of Labour and National Service concerned.

Limitation of Supplies

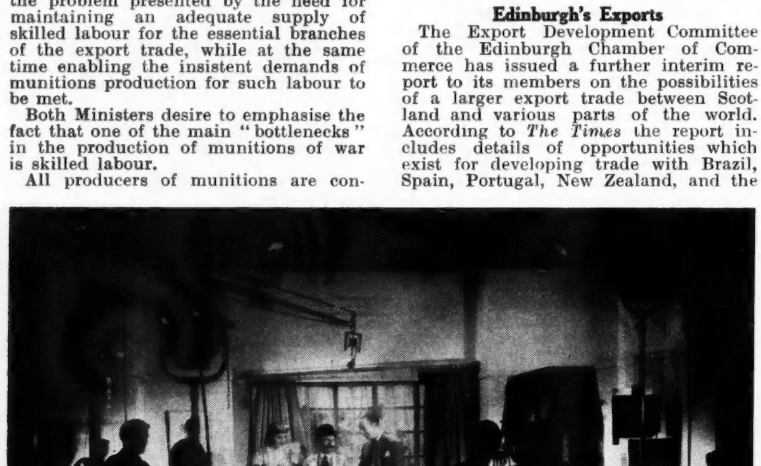
Sectional lists of persons whose names are entered on the Home Trade Register under the Limitation of Supplies (Miscellaneous) Order are now being issued by the Stationery Office. The list for Class 17, which covers a number of electrical appliances, is obtainable at the price of 1s. (1s. 1d. including postage).

In connection with the same Order the Board of Trade states that the Purchase Tax is *not* to be included in the computation of the value of controlled goods supplied during either the standard period (June 1st to November 30th, 1939) or the current period (June 6th to November 30th, 1940).

Edinburgh's Exports

The Export Development Committee of the Edinburgh Chamber of Commerce has issued a further interim report to its members on the possibilities of a larger export trade between Scotland and various parts of the world. According to *The Times* the report includes details of opportunities which exist for developing trade with Brazil, Spain, Portugal, New Zealand, and the British West Indies and covers a fairly wide range of goods including paints, cutlery, needles, porcelain, belting, wire rope, and various kinds of industrial machinery.

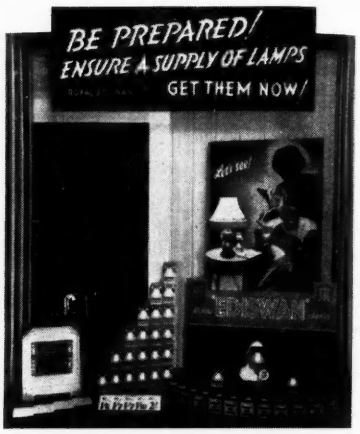
Communications have been addressed by the Chamber's Committee to a large number of overseas organisations, and replies which are now being received indicate a readiness on the part of members of these organisations to explore the possibilities of buying their requirements from this country and the Edinburgh Chamber is assisting in making contacts between respective buyers and sellers.



A scene during the production of the "Ekco" lamp film

Lamp Publicity

Two window displays are the principal new units of Ediswan display publicity for 1940/1, and the accompanying illustration shows the arrangement in the



Ediswan lamp window display

standard large and small window schemes.

The new components are the centrepiece with the slogan "Now Let's See"; the "Be Prepared" banner at the top of both windows; a literature container repeating the "Be Prepared" message; and a window transfer repeating the design and message of the new centrepiece. Literature comprises the new general lamp catalogue and leaflet, both of which carry the cover design shown on the leaflet in the leaflet container, an A.R.P. domestic lamp folder, type B folder, and motor lamp folder.

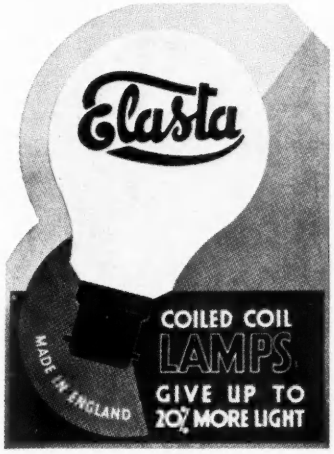
This season Ediswan again enters the publicity film field with one-minute features in "The Signs of the Times," a magazine reel of topical and general interest. The first of these films, showing very graphically how light is measured, was released for general distribution on August 26th.

With the object of making the name "Ekco" as well known for electric lamps as it is for radio apparatus, E. K. Cole, Ltd., have just completed a short humorous publicity film for showing in cinemas all over the country. "A Bright Idea," as the film is called, is intended to link up with Press publicity schemes, window displays, &c. Including Claude Hulbert, Hay Petrie and Launne Shaw, it has a very definite entertainment value, the advertising side being kept very much in the background and appearing only just at the end. The scene of the film is a newly-weds' home, with Claude Hulbert putting up curtains. The noise he makes doing this is "Ekcoed" by Hay Petrie, who, after Claude has fallen off the steps and knocked over his wife and various flower pots, brings light and a happy conclusion by delivering some "Ekco" lamps.

E. K. Cole's first full selling season with electric lamps will also be marked by a distinctive programme of advertising and sales promotion support for both "Ekco" and the shilling "Sirius" lamps. In preparing a comprehensive range of sales aids, due regard has been paid to the national necessity for paper economy, first by avoiding the use of materials with a potentially short life, and, secondly, by restricting to economical limits the distribution of individual items. It is anticipated, however, that supplies will be adequate for all retail outlets. Considerable variety is offered in the new range of dealer aids, no fewer than fourteen different items being available.

The announcement of the new programme also carries details of additional lamps in the "Ekco" range. A series of the "coiled coil" type is introduced comprising the usual sizes from 40 to 100 W in clear and pearl. Traffic signal types, plain and twisted candles and architectural tube lamps are also added to the existing range. The complete campaign is dealt with in a broadsheet which is being sent out immediately.

Pope's Electric Lamp Co., Ltd., has again issued for the use of dealers selling "Elasta" lamps an attractive window display card measuring 27½ in. by 20 in., and printed with a three-colour background in orange, red and blue, with the trade mark "Elasta" in green. The card is suitable for window or counter use.



Pope's new window display card

Import Trade of Iraq

During the first three months of this year imports into Iraq of electrical machinery, &c., were valued at 34,000 dinars, as compared with 89,000 dinars in the corresponding quarter of 1939. The value of imported boilers, machinery, &c., was 122,000 dinars, against 162,000 dinars. (The par value of the dinar is £1 sterling.)

Control of Prices

Mr. Raymond Evershed, K.C., chairman of the Central Price Regulation Committee, in a statement issued last week, said that the Committee felt that now was the time to make the Prices of Goods Act even more effective before restriction of production drastically limited supplies, providing favourable opportunities for speculators, and the levy of the Purchase Tax materially increased prices. Up to the present there had been no serious scarcity of articles, but the time was likely to come in the course of the next month or two when a scarcity in some articles would make itself felt. It was the duty of the public to bring to the attention of the local Price Regulation Committees any instances of profiteering. In the eight months to August the local Committees had investigated about 3,000 complaints, of which torch batteries, with 650 cases, were the subject of by far the greatest number of complaints.

The Price Regulation Committee for the Southern Region announces that many traders accused of overcharging apparently think it sufficient excuse to claim that, though they have made an overcharge, this was due to a mistake, either on their part or on the part of an assistant. This excuse has been put forward to the Committee on no fewer than twenty-one occasions. The Committee wishes it to be made perfectly clear that a mistake, even if genuine, is not a valid defence under the Prices of Goods Act. It is the duty of all traders to acquaint themselves with the law and to obey it.

American Electrical Production

The *Electrical World* (New York) reports that orders received in June for motors and generators and for transmission and distribution equipment were the highest on record of any corresponding month in the history of the National Electrical Manufacturers' Association index, which covers the period beginning with 1934. The index of orders for motors and generators rose 43.7 points in June from the May figure of 117.2 to 160.9, as compared with 87.8 in June of last year. Index of orders for transmission and distribution equipment gained 55.5 points in June from the revised May figure of 126.0 to 181.5, as compared with 97.8 in June a year ago.

Averaging the indices for the first six months of 1940 shows both equipment groups above last year, but still below 1937, the previous record year. For motors and generators the average for the first half of this year was 116.1, as compared with 79.9 in 1939 and 146.6 in 1937. For transmission and distribution equipment the average for the first six months of 1940 was 136.7, compared with 101.5 for a year ago and 180.9 for the first six months of 1937.

If the favourable trend in American trade shown by Department of Commerce reports for the first half of 1940 continues, orders for electrical goods in 1940 may be the largest since 1929. These data, based on reports by 78 manufacturers, show bookings for 1929 of $1,065,510,043. New orders booked for electrical goods by these manufacturers in the first six months amounted to $506,966,029, approximately 25.8 per cent. ahead of last year, although about 4.7 per cent. below the same 1937 period.

Orders in the second quarter of 1940 were the largest for any corresponding period since 1929, totalling $268,120,065, as against $238,845,964 in the first quarter and $205,567,343 in the second quarter of 1939. In 1929 orders for the first quarter were $270,483,965, for the second quarter $285,090,125, totalling $555,574,090 for the first six months.

Mining Electrical Engineers

A sub-branch of the Midland branch of the Association of Mining Electrical Engineers has been inaugurated at Ashby-de-la-Zouch.

Premier and Street Lighting

In the course of his statement to the House of Commons last week, the Prime Minister touched upon the subject of street lighting. He said that he had asked a "committee of persons deeply versed in the subject, responsible people in the Departments, to meet together to see in what way we can make more light and cheer in the winter months and at the same time subserve the purposes of alert and alarm."

Swiss Company's Problems

In its annual report for the year ended March 31st, 1940, the A.G. Brown Boveri & Cie., of Baden, Switzerland, states that its chief problem is the supply of raw materials, but it has so far managed to solve this satisfactorily. Stocks of raw materials on hand at March 31st were valued at fr.16.1 million, against fr.12.8 millions in the previous year, while stocks of finished and semi-finished products were valued at fr.17.4 millions (against fr.14.9 millions). The loss of about half of its personnel through mobilisation has created a further problem. The total orders received during the year exceeded those received during previous years, but prospects for the future were uncertain. A decline in domestic orders had to be anticipated during the next few years, and, in addition, during the weeks preceding the issue of the report, developments in the war had rendered it impossible for the company to deliver its products to a large part of its former sales territory.

Fittings for Industry

Referring to the article on the above subject in last week's issue of the ELECTRICAL REVIEW, V. H. Iddon, Ltd., point out that we have given their old address. The company's present offices are at Harper Road, Wythenshawe, Manchester.

We regret that one of the new Harcourt "Harfleur" reflectors for 80-W fluorescent tubes illustrated on page 192 was inadvertently ascribed to the G.E.C.

Prices of Materials

Edward Till & Co., report September 11th: India rubber, Para fine 1s., 1d. decrease.

Henry Gardner & Co., Ltd., report September 11th: English block tin, £249, £6 15s. decrease.

New Catalogues and Lists

Watson & Sons (Electro-Medical), Ltd., 76, Castle Street, Reading.—A folder drawing attention to the company's equipment for works solaria.

Newton & Wright, Ltd., 68, Ballards Lane, Finchley, London, N.3.—Leaflets illustrating the "Omnipruf" X-ray tube and "Tetravalve" high voltage generator and control desk for diagnostic plant.

Belling & Co., Ltd., Southbury Road, Enfield, Middlesex.—Catalogue and leaflets describing the new season's fires, small and large cookers and boiling rings; also a simply constructed snuffer for smothering incendiary bombs.

Gramophone Co., Ltd., Hayes, Middlesex.—Leaflets descriptive of radiogramophones and AC or DC radio receivers; also service information sheets and a Marconi valve data sheet for quick reference to equivalents.

Wardle Engineering Co., Ltd., Old Trafford, Manchester, 16.—Publication No. H257 (reprint No. 7), containing illustrated particulars of "Maxheat" oval tubular heaters, radiators, Wardle thermostats, Wardle-Bray DC and AC contactors, &c. There is also a good deal of useful electric heating data. Also the "Maxheat" folder (H.265).

R. F. Winder, Ltd., Belgrave Electrical Works, Leeds.—The September register of surplus new and second-hand electrical material.

Colliery Electricians Fined

THE *Nottingham Journal* reports that as a sequel to the death of a man at the Cossall Colliery, Ilkeston, John Hunter, formerly electrician at the colliery, was fined a total of £8 at Nottingham on September 4th. The amount was made up of fines of £2 each on four counts—failing to make a proper examination of apparatus at the colliery on August 2nd; failing to make dead a part of a circuit affected by a fault until this had been remedied; failing to keep apparatus free from dust, dirt and moisture; and failing to earth apparatus effectively before it was handled.

It was stated for the prosecution that the deputy on the night shift at Cossall Colliery on August 1st-2nd reported a defect on an electric coal-cutter and Hunter was instructed to attend to it at once. A man named Wardle was sent to do repairs at the switch box which controlled the cutter although he was a fitter, not an electrician. He was instructed to put a new pin in the box and having done it he asked another man to close another switch. A loader came along and touched the switch on which Wardle had been working and received a fatal shock. A Mines Inspector at once made inquiries and tests which showed that whatever the defect had been Wardle had not remedied it and the switch had not been tested by an electrician after he completed his work. Further tests showed that the earth wire was broken, rendering a cut-out ineffective and current was leaking into the box. Had Hunter done his duty tests would have been made directly Wardle had completed his job. Examination of the box showed that it was not in a proper condition and for this Hunter was also responsible. Hunter was given the opportunity of resigning immediately, which was a serious hardship as he had been with the company for twenty years.

Pleading guilty, Hunter said that he did not send Wardle to attend to the defect but sent word to the shop to send an electrician down. With regard to the condition of the box, he said that it was sent down a fortnight before it was put there. He maintained that the men did not care a rap about apparatus and also that he was so rushed about that he had no time to test equipment.

Another case arising out of the death of a miner is reported by the *Newcastle Journal*. At Newcastle on August 28th George Wightman, manager of the Montagu Main Colliery, Newburn, was fined £10, James Allison, chief electrician £2, and Robson Buchan £2 for contraventions of the Coal Mines Act. A summons against the owners was withdrawn on payment of costs and one against the agent was dismissed on payment of costs. The offence was stated to be that there was no connection from a motor, used for hauling tubs, to the earthing system at the surface of the mine. An extra switch had been installed as a precautionary measure but was disconnected for replacement at the time of the accident.

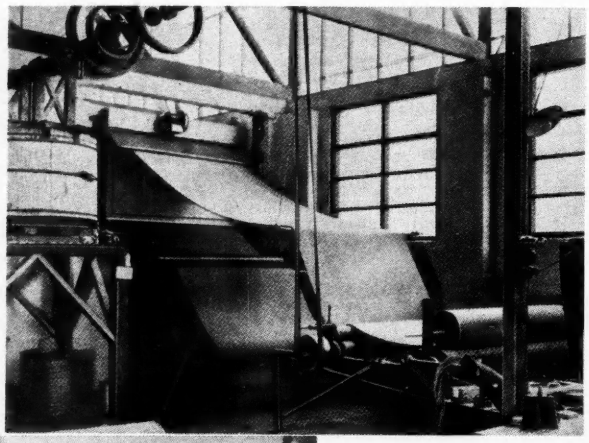
LOAD-BUILDING IN SYDNEY

Success of Refrigerator Hire-purchase Scheme

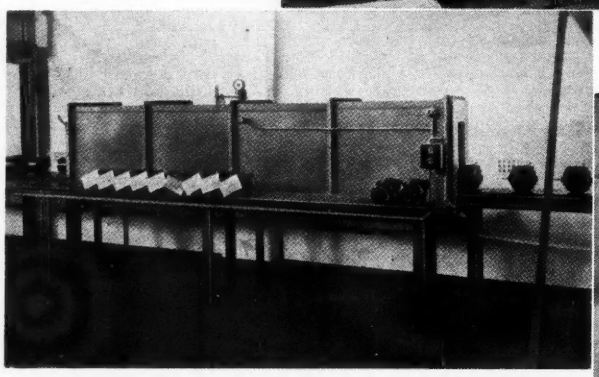
THE period covered by the latest annual report of the Sydney (N.S.W.) County Council Electricity Department—the calendar year 1939— witnessed the retirement of Mr. H. R. Forbes Mackay, who had occupied the position of general manager for thirty-one years, during which the undertaking had grown to be one of the largest in the Commonwealth. On October 7th he was succeeded by Mr. R. Vine-Hall, who had held the position of chief engineer.

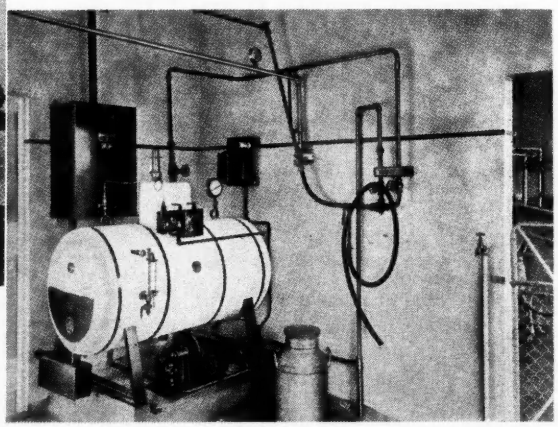
Another important event during the year was the commencement of the erection of a large new power unit, a Parsons three-cylinder 3,000-RPM condensing reaction turbine of 50,000 kW rating, required to meet the rapid expansion of consumption in the Department's area.

In the early part of the year officers of the Council and the New South Wales Department of Railways discussed a proposal to extend the agreement between the two authorities in order to provide for an interchange of energy on a larger scale than hitherto, the object being to determine the best means of utilising their combined resources by increasing the rating of power station interconnection and by interlinking the transmission systems. Later, the Electric Light and Power Supply Corporation entered into the discussion with the idea of joining in a three-party agreement. Before the negotiations were completed the Minister for Works and Local Government directed the Electricity Advisory Committee of New South Wales to investigate and report upon wartime precautions to ensure the maintenance of essential services and a Technical Panel was set up which prepared a scheme of interconnection to meet defence requirements which, if carried out over a period of years, would also be justified on an economic basis. The scheme was approved by the Minister and the bodies concerned were requested to put it into operation without delay. The Sydney County Council adopted the scheme and authorised an expenditure of £240,000 on that part devolving upon it.



During 1939 a total of 741.2 million kWh was generated at the Council's power stations, and although this was an increase of 57.3 million kWh on the previous year, transmission losses were reduced from 90.8 million to 79.0 million. On the basis of the total output (712.4 million kWh) the losses amounted to 11.1 per cent. against 13.8 per cent. in 1938, and in the preceding ten years the proportion had not fallen below 14 per cent., so it is seen that last year's transmission-loss figure represents a substantial saving.

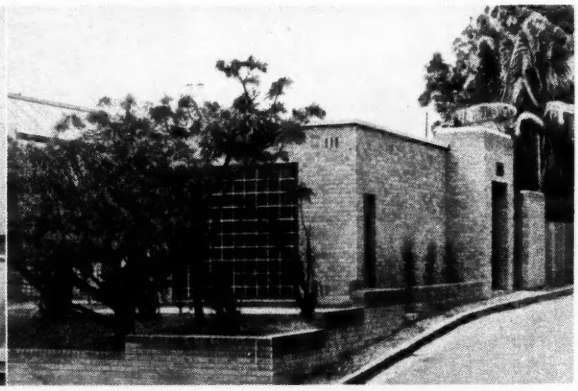




Above: Felt entering and leaving a 150-kW four-tier drying tunnel at a Sydney factory

A 6½-kW conveyor-type paint drying oven at the works of Crompton Parkinson (Aust.) Pty., Ltd., and (right) a 60-kW electric steam generator supplying steam for washing and sterilising purposes in a dairy

The total quantity of electricity sold during the year was 633.4 million kWh, which roughly approximates to that of the Sheffield undertaking in this country. The increase last year was a record one—66.2 million kWh compared with 51.1 million kWh in 1938—and the rate of expansion also accelerated from 9.9 to 11.7 per cent. An analysis of sales shows that high-voltage bulk and industrial supplies increased from 107.6 million to 122.9 million kWh, low-voltage industrial supplies



An Australian all-electric kitchen and (right) a neat 11-kV distribution substation

from 196.2 million to 215.8 million kWh, commercial consumption from 95.9 million to 104.6 million kWh and domestic supplies from 152.0 million to 175.3 million kWh, while there was a decrease in street lighting consumption from 15.5 million to 14.8 million kWh. The growing importance of the domestic load is indicated by the fact that this now represents 27.8 per cent. of the total sales. In 1938 the number of consumers connected reached the quarter-million mark, and by the end of last year had risen further to 256,035, with an average consumption, excluding street lighting, of 2,416 kWh compared with 2,203 in the previous year.

Promotion of sales of electricity and motor hiring is the function of the Electricity Sales Branch, one of the principal activities of which last year was the introduction of a scheme for selling refrigerators to consumers in co-operation with firms supplying the equipment which resulted in unprecedented sales of this class of apparatus. The plan was only put into operation in October, but by the end of the year 2,026 orders had been issued to suppliers, and it is estimated that the use of these refrigerators should result in an additional consumption of one million kWh annually.

Connection of other domestic apparatus was also intensified, the number of ranges added being 3,133 against 2,987 in 1938, raising the total number in use at December 31st to 12,708. A special offer was introduced in 1938 with the idea of increasing the sale of ranges, but this was discontinued last year as it was felt that special inducements were no longer necessary, the electric range having become a common and accepted part of the household equipment. Altogether domestic apparatus aggregating 21,126 kW was sold last year, with an estimated annual consumption of approximately 8.5 million kWh. In addition, under a scheme started in March, 1938, 4,947 1½-gal. water-heaters and 701 wash-boilers were hired out last year, with an estimated annual consumption of 8.3 million kWh.

The sale of commercial frying, roasting and baking equipment, hot-water services and refrigerators was continued, the value of apparatus disposed of during the year being £12,853, with a total rating of 1,362 kW. Outstanding among this apparatus were 45 kW of cooking and water-heating equipment for a suburban café, several pastry and bread-baking ovens of 3 to 10 kW, an all-electric kitchen for a flying boat base, mobile bain maries for hospitals and several large hot-water service installations.

The Council has a very large industrial heating load and this was raised by 1,705 kW last year. Types of equipment sold, of which some examples are illustrated, included metal-melting pots, tempering baths, steam generators, heat treatment furnaces, welding plant and drying and baking ovens.

Steps were taken to improve the standard of lighting in homes, shops and factories. In the domestic field the Council's canvassers achieved greater success than hitherto, and 16,287 standard lamps and kitchen fittings designed in accordance with scientific principles were sold compared with 8,729 in the previous year. The commercial and industrial campaign did not come quite up to anticipations from the point of view of apparatus sold, but nevertheless brought about a considerable improvement in lighting conditions.

Altogether apparatus sold and hired during the year amounted to 54,204 kW against 48,043 kW in 1938, representing an estimated annual consumption of 35.7 million kWh.

The revenue received from all sources was £3,224,929 and expenditure amounted to £3,154,036, leaving a net profit of £70,893. The average price received per kWh sold fell from 1.236d. to 1.196d. and the cost from 1.222d. to 1.195d. The highest price paid by any one consumer was 5d., and the lowest 0.526d., by a steel manufacturing company taking a supply under special conditions. The greatest consumption by one customer was 9.2 million kWh by a brewing company.

Evacuation and Hire-purchase

The I.M.E.A's Transfer Scheme

THE position of electricity supply undertakings in the matter of hire-purchase agreements made with consumers who have had to move from their areas is considered in the September *I.M.E.A. Journal*. The Defence (Evacuated Areas) Regulations provide that when premises in an area are unoccupied at or after the date of a declaration that the area is an evacuated area no sum payable for the supply of gas, water, electricity or telephone services shall be recoverable during the evacuation period. Likewise no sum shall be recoverable during the evacuation period under any contract for the hiring or hire-purchase of goods by a person who, in the case of goods used solely for the purpose of a business, has ceased to carry on that business in an evacuation area or, in any other case, has ceased to reside in the area.

Representations have been made regarding the position of public utility undertakings in towns which have been compulsorily evacuated. The financial position of some of them may be, or become, very serious, and discussions are proceeding with a view to the formulation of some scheme for assisting public utilities in these areas.

Transfer of Agreements

In June the I.M.E.A. circularised its members suggesting that arrangements could be made between undertakings for hire-purchase agreements with consumers moving to other areas to be transferred. About half of the membership replied to the circular but only half of these agreed to participate in the scheme. The *I.M.E.A. Journal* publishes a list of just over a hundred undertakings of the latter class, five of which make reservations with regard to the terms of transfer. The *Journal* says that there may be difficulties in carrying out a scheme of this nature, but in times like the present, when the production of various appliances has been reduced, it is essential for the well-being and development of undertakings to institute some scheme of transfer and any difficulties should not be insurmountable.

There is a possibility of cookers, etc., being stored away and serving no useful purpose, because the undertaking into whose area a person has moved is unable to take over the hire-purchase agreement as the financial arrangements in one area are different from those in another. Arguments such as these may lead to the complete failure of the scheme. Those members who have not expressed their willingness to enter the arrangement are urged to reconsider the matter on the grounds of national necessity.

Many members have expressed the opinion that hire-purchase agreements may vary so considerably as to stultify the practical working of any scheme of transfer. During a time like the present, however, it should not be impossible for undertakings to waive their own individual scruples and agree to the continuing of any hire-purchase agreement in respect of apparatus brought into their areas and connected to their supply. The financial effect will be infinitesimal and the scheme will operate only during the war.

Mr. A. L. Burnell, Finance Officer to the London and Home Counties J.E.A., proposed a basis for the calculation of transfer values upon the passing-over of a hire-purchase transaction. The equity of this was questioned by Mr. L. S. P. Walpole, Assistant Borough Treasurer, Bethnal Green. In reply, Mr. Burnell maintained that in seeking a generally acceptable basis for the transfer of agreements other than purely mathematical considerations arose.

The object was to make the transfer readily acceptable to all parties, in which connection it had to be remembered that hire-purchase business was subsidiary to the sale of current, which it was designed to assist, and that, therefore—

(i) The transferor undertaker would generally prefer to be rid of the transaction on losing the consumer.

(ii) The transferee undertaker would not ordinarily be anxious to facilitate the transfer which would involve either chargeable or non-chargeable maintenance of apparatus, possibly not standard in the area of the transferee undertaker, growing more troublesome with time.

(iii) The consumer, by his desire to retain in use apparatus for which he would partly have paid, could, so to speak, be regarded as certain to act in the best interests of the transferee undertaker.

The actual rate of return on capital appeared, in these circumstances, to be immaterial, to introduce an unnecessary complication and to ignore the growing maintenance liabilities of transferred apparatus—liabilities which might be expressly undertaken in the hire-purchase agreement or assumed to a greater or less degree by consumers. It was considered necessary to make the transfer basis:—(i) Simple, readily calculated, easily understood; (ii) free of difficulty to the consumer; (iii) definitely attractive to the transferee undertaker; (iv) applicable without exception to the endless variety of hire-purchase terms offered by different undertakers; (v) remunerative enough to the transferee undertaker to meet the cost and trouble of maintenance whether expressly provided or not.

Fatalities

WHILE stacking scrap iron at premises in Clapham Road, London, S.W., Charles Davis, aged 16, came into contact with an uncovered ceiling rose and received a fatal electric shock. A verdict of "Accidental death" was returned at the subsequent inquest.

Joseph Ward (34), Manchester, was killed recently while working on a lift installation. Evidence was given at the inquest that in the course of changing over the installation from DC to AC a live wire fastened by a piece of string to a window caught on a pulley chain. It was not thought possible to switch off the current as it was necessary for the operation of other lifts. Ward caught hold of the chain: a witness tried to release him and when he finally succeeded Ward was found to be dead. A verdict of "Death by misadventure" was returned, the coroner stating that the wire should have been properly secured or the current switched off while the work was proceeding.

ELECTRICITY SUPPLY

Position at Clacton and Felixstowe. Manx Electricity Costs

Accrington.—CHARGES UNALTERED.—Sir Thomas Higham, chairman of the Electricity Committee, has informed the Town Council that it is not proposed to increase electricity charges for the time being. The favourable balance of £19,813 on the past year's working was satisfactory.

Bacup. — MODIFIED LIGHTING.—Alderman Ireland, chairman of the Electricity Committee, stated at the Council meeting on September 5th that equipment for restricted lighting would be installed almost at once.

Bradford.—ELECTRICITY DEFICIT.—A loss of £31,769 on the working of the Electricity Department during the financial year ended March 31st last was reported to the Electricity Committee last week. Reasons given for the loss were lighting restrictions, increased cost of material, money spent on A.R.P., and capital charges. Income totalled £829,051 (an increase of £42,238) and expenditure amounted to £860,820 (increase £71,903).

Bristol.—SUSPENSION OF STREET LIGHTING.—As a temporary measure it is reported that the Emergency Committee has given notice that the modified lighting of streets is to be suspended.

Clacton-on-Sea. — REDUCED CONSUMPTION.—At the September meeting of the Urban District Council it was reported that the consumption of electricity had decreased by 75 per cent. in the last few months. The accounts of the undertaking for the year ended March 31st last showed a gross profit of £18,931, but after deducting loan charges, &c., there was a net loss of £4,311. The charges for electricity have not been increased. Councillor H. P. King, chairman of the Committee, said it was likely that the Electricity Commissioners would in due course make some proposals to the Government with regard to the position of electricity undertakings like theirs.

Colne.—MINIMUM CHARGE WAIVED.—The electrical engineer has reported that certain consumers joining the Forces have applied for the minimum charge to be waived on the ground that their houses, though furnished, would not be occunied in the ordinary sense during their absence, and the Council has agreed to this concession.

Felixstowe. — HIGHER CHARGES. — The electrical engineer (Mr. A. J. Waring) submitted details of the probable income and expenditure for the current financial year at a recent meeting of the Electricity Committee, and recommended an increase in charges as from October 1st. After careful consideration the Committee resolved to advance all charges for electrical energy and meter rents by 10 per cent., but not to make any increase in rentals for the hire of apparatus. The position will be further reviewed in December. At last week's Council meeting Councillor J. H. Boden, chairman of the Committee, said it might be assumed from the annual report that the electricity undertaking had worked fairly well in the past year. Since March, however, there had been a reduction of 40 to 50 per cent. in the undertaking's income. Whereas last year's income was in the region of £35,000, it was estimated that this year's would be down to £20,000 to £21,000, and there would probably be a loss of about £4,000.

Grimsby.—LOAN APPLICATION.—At its meeting last week the Electricity Committee authorised application to the Electricity Commissioners for permission to borrow £5,600 for unspecified mains and services, £1,000 for motors, and £1,100 for apparatus for hire. The electrical engineer (Mr. S. Windle) said that these amounts were limited to the requirements for one year and were on the basis of present war conditions continuing.

Inverness.—BULK SUPPLY FAILURES.—It was recently reported to the Town Council that during the period from June 7th to July 8th there had been thirteen interruptions in the partial bulk supply from the Grampian Co., but that there had been no breakdown as the electrical engineer and manager (Mr. G. C. MacLean) had taken the precaution of having one set turning over in case of emergency. The Grampian area engineer at Elgin said that the interruptions were due to lightning storms. During August there were a further three failures of the bulk supply which would have resulted in a complete breakdown had not the large turbine been on load. Representations were again made to the area engineer, who said that the interruptions were due to transmission line faults. In reply to a question, Provost Mackenzie said it was understood that steps were being taken to overcome the trouble. Councillor Macpherson asked whether it had not been stated at the inquiry held by the Electricity Commissioners that no fault could possibly take place in the electricity supply if they had a partial bulk supply from the Grampian Co., and Mr. Bruce remarked that up to the present the Grampian supply had been disappointing.

PRICE INCREASE.—The Council approved an increase in electricity charges as from August 16th. The lighting flat rate is raised from 4½d. to 5d. inside the burgh and from 5d. to 5½d. outside. In both areas the running charge of the domestic tariff is advanced from ⅝d. to ¾d., with no alteration in the fixed charge. In the burgh the running charge of the contract tariff is increased from 1d. to 1¼d. and outside from 1¼d. to 1½d.

Isle of Man.—BULK SUPPLY CHARGE DISPUTE.—The hearing of evidence was completed on August 28th in the High Court action brought by the Isle of Man Electricity Board for a declaration of the rights and liabilities of the Board and Douglas Corporation under Section 9 of the I.O.M. Electric Light and Power Act, 1932. The hearing was opened several weeks ago at Castletown (ELECTRICAL REVIEW, July 26th), the later proceedings being held at Douglas. Mr. J. D. Qualtrough, Speaker of the House of Keys and a member of the Board, asserted that it was the Board's desire to proceed with the erection of its own generating plant at the earliest possible moment. Evidence was also given by Mr. V. A. F. Bellamy, the Board's engineer and secretary.

The final day was devoted to evidence by Mr. Bertram Kelly, borough electrical engineer of Douglas. He said that when the Corporation offered to submit the point at issue to an independent engineer nominated by the chairman of the English Electricity Commissioners the Board would not agree. He admitted that the proposal contained a condition that neither party was to be bound by the decision of this independent engineer, but added that he didn't see how the Corporation could have ignored the opinion of such an arbitrator.

Mr. G. E. Moore (for the Board), in cross-examination, asked whether the Board had not said that no useful purpose could be served in appointing an arbitrator if his decision were not to be binding? Mr. Kelly replied that the Board had not shown any enthusiasm for putting the matter before an independent mind for decision. Mr. Moore remarked that he was present at conversations when it was put forward by the Board that there should be a settlement by arbitration. Mr. Kelly, however, maintained that the Board had never asked the Corporation that any arbitration should be binding; it wanted a settlement on the terms of one or other of the offers which it made. Legal arguments on the points at issue were heard last week.

Leicester.—MODIFIED STREET LIGHTING.—The city's £20,000 wartime street lighting system was switched on for the first time on August 26th. It covers every main road and side street in the city.

Lincoln. — EXTENSION OF "STARLIGHTING."—The low-intensity street lighting system which in certain streets has proved so successful is to be extended to all city's main thoroughfares apart from those where gas lamps are installed.

Sleaford. — ELECTRIC PUMPING.—The U.D.C. is urging the Ministry of Health to sanction the electrification of the Greyless pumping station.

Southport. — COMPANY'S MINIMUM CHARGE.—The Town Clerk reported to the Electricity Committee recently that the Birkdale District Electric Supply Co. was making a minimum quarterly charge of 7s. 6d., as compared with the charge of 5s. made by the Corporation, and he was instructed to take steps to secure the observance by the Company of the terms of the agreement not to make charges in excess of those of the Corporation.

Stanley (Durham). — SPECIAL ORDER AMENDMENT.—The Urban District Council has applied to the Electricity Commissioners for the amendment and alteration of the Stanley Electricity Special Order, 1939, which was applied for in June, 1939. It is now proposed to constitute the Annfield Plain Electric Lighting Order, the Tanfield Electricity Special Order, and the Stanley Order as one undertaking, and to supply the whole of the Stanley urban district excepting parts which come under the County of Durham Review Order, and also to supply certain other areas and to give the Council authority to break up streets in the proposed area.

Worcester.—MALVERN BULK SUPPLY.—In June last year the Electricity Committee decided to apply to the Electricity Commissioners for sanction to borrow £12,250 for an increased bulk supply to Malvern. At the outbreak of war all borrowing applications were cancelled, with instructions to re-apply in the case of priority works. Subsequently the Malvern electrical engineer submitted particulars of load developments and a meeting with the Electricity Commissioners was held at Malvern as a result of which, states the Worcester *News and Times*, a scheme for a new transmission line to Malvern was agreed to and priority certificates provided. It is now proposed to make application for loan sanction.

Overseas

Eire.—PEAT SCHEME HELD UP.—Speaking at a luncheon given by the Turf Development Board last week, Senator W. Quirke said that on the basis of achievements at Clonsast, Turraun and Pyrecrumpane they looked forward to an extension of the Board's activities. He believed that the electrical development of the bog would solve the rural problem. Mr. R. C. Ferguson, Secretary of the Department of Industry and Commerce, said that the project for building a peat-burning power station was held up in the present crisis. He considered it a wise thing for the Government to exhort the wider burning of native fuel; the big problem was to create a market as near as possible to the bog. It was stated that at Clonsast the quantity of cut turf had increased from 17,000 tons last year to 50,000 tons this year.

Sweden.—POWER FROM WATERFALLS.—A recent announcement in the Swedish Press has stated that the Swedish Government is to acquire the well-known Tännforsen Fall in the northern province of Jämtland. The news has been received by the Swedish people with feelings of regret as it is one of Sweden's most beautiful waterfalls, and thousands of mountain wanderers every year visit this wild and enchanting spot. It is understood, however, that there is no intention of harnessing the fall for years, and the contract includes certain stipulations assuring that as much as possible of the beauty of the fall will be preserved.

The Swedish Board of Waterfalls, which controls about one-third of the country's power supply, has just issued its annual report for 1939. The Board's revenue from the supply of power was 25,000,000 kr. (£1,353,000) or nearly 2,000,000 kr. more than in 1938. Capital invested in plant increased by 27,500,000

(*Continued on next page*)

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

17491. "Electric-discharge lamps." General Electric Co., Ltd., J. N. Bowtell and H. G. Jenkins. June 13th, 1938. (524800.)

32095. "Manufacture of fluorescent materials." British Thomson-Houston Co., Ltd., J. T. Anderson and R. S. Wells. November 5th, 1938. (524802.)

36465. "Electric phase-shifting circuits." British Thomson-Houston Co., Ltd. December 14th, 1937. (524925.)

1939

535. "Electrical signalling systems and apparatus for use therein." Automatic Telephone & Electric Co., Ltd., and P. N. Roseby. January 6th, 1939. (524685.)

1185. "Testing of electrical insulators." Bushing Co., Ltd., and W. J. Brown. January 13th, 1939. (524862.)

3336. "Power supply to repeater stations in a transmission system." Standard Telephones & Cables, Ltd., and B. B. Jacobsen. February 1st, 1939. (524930.)

3599. "Tone correction or modification in audio-frequency amplifiers." E. K. Cole, Ltd., and A. W. Martin. February 3rd, 1939. (524690.)

3654. "Telecommunication exchange systems." Standard Telephones & Cables, Ltd. February 12th, 1938. (524700.)

3661. "Electrical indicating system for radio direction-finding." C. Lorenz Akt.-Ges. February 4th, 1938. (524701.)

3702. "Moving contact electric current convertors." Siemens Schuckertwerke Akt.-Ges. February 3rd, 1938. (Addition to 492369.) (524705.)

3703. "Stirring apparatus for furnaces with gas or electric heating." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. February 3rd, 1938. (524706.)

3707. "Supports for pipes, conduits, or electric cables." J. R. O. McGregor. February 3rd, 1939. (524708.)

3739. "Magnetos for internal combustion rammers." R. Bosch Ges. February 4th, 1938. (524809.)

3741. "Production of rovings and of insulating coatings on electrical conductors." Allgemeen Kuntsvezel Maatschappij N.V. February 4th, 1938. (524810.)

3748. "Electric protective arrangements." British Thomson-Houston Co., Ltd., and P. Mathews. February 4th, 1939. (524718.)

3809. "Electric lighting fittings." Co-operative Wholesale Society, Ltd., and R. H. Line. February 6th. 1939. (524867.)

3810. "Mercury and the like switches." Jefferson Electric Co., and F. S. Armstrong. February 6th, 1939. (524726.)

3814. "Electrically driven hand-tools." R. Shumann. February 6th, 1939. (524739.)

3850. "Electric transforming and rectifying equipment." Ericsson Telephones, Ltd., and L. S. Distin. February 6th, 1939. (Addition to 458716.) (524747.)

3856. "Luminous discharge tubes." Neograph, Ltd., and F. Knepper. February 6th, 1939. (524748.)

3860. "Gas-blast electric circuit-breakers." British Thomson-Houston Co., Ltd. February 5th, 1938. (524727.)

3873. "Power operated mechanism applicable, for example, to electric switchgear." General Electric Co., Ltd., and C. J. O. Garrard. February 6th, 1939. (524729.)

3897. "Tuning mechanisms of radio receivers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 8th, 1938. (524752.)

3904. "Electric motors for razors or other hand-held appliances." Casner Patents, Inc. February 12th, 1938. (524754.)

3983. "Thermionic valves having ceramic bases. M-O Valve Co., Ltd., J. Richards and G. W. Warren. February 7th, 1939. (524815.)

3991. "Electro-magnetic switches." British Thomson-Houston Co., Ltd. February 8th, 1938. (524816.)

3998. "Carbon-pile regulators." J. Stone & Co., Ltd., and A. H. Chilton. February 7th, 1939. (524,818.)

4000. "Electrically operated vibrator apparatus." Westinghouse Brake & Signal Co., Ltd., and A. H. B. Walker. February 7th, 1939. (Cognate application 20227/39.) (524,868.)

4006. Luminous-bowl electric lighting fixture." G. Ainsworth. February 7th, 1939. (524,773.)

4017. "Harmonic-producing apparatus." Standard Telephones & Cables, Ltd. April 9th, 1938. (Cognate application 4018/39.) (524,775.)

4020. "Television receivers of the superheterodyne type." Kolster-Brandes, Ltd., and C. N. Smyth. February 7th, 1939. (524,776.)

4050. "Electric lamps." Stadium, Ltd., and L. G. Seymour. February 7th, 1939. (524,784.)

4082. "Electrical bell pushes." H. A. Wooton. February 8th, 1939. (524,869.)

4089. "Fastening devices for the caps of sparking plugs." R. Bosch Ges. February 19th, 1938. (Addition to 344,332 and 369,876.) (524,791.)

4148. "Cathode-ray tubes and like electric-discharge devices having ceramic bases." General Electric Co., Ltd., J. Richards and G. W. Warren. February 8th, 1939. (524,826.)

4149. "Water-heaters." General Electric Co., Ltd., R. Harvey and O. W. Humphreys. February 8th, 1939. (524,827).

4152. "Submarine cable-embedding apparatus." British Western Union, Ltd. February 19th, 1938. (524,828.)

4153. "Submarine cable-laying apparatus." British Western Union, Ltd. February 19th, 1938. (524,829.)

4154. "Apparatus for determining the topography of the bed of the ocean or other body of water." British Western Union, Ltd. February 11th, 1938. (Addition to 507,353.) (524,830.)

4155. "Methods of and apparatus for laying submarine cables." British Western Union, Ltd. February 23rd, 1938. (524,831.)

4202. "Electric cables." Commercial Secretaries, Ltd., S. Welbourn, W. P. Fuller and J. R. S. Orchard. February 8th, 1939. (524,796.)

4218. "Control apparatus for railway signals and points." Vereinigte Eisenbach-Signalwerke Ges. February 8th, 1938. (524,845.)

4234. "Adaptors for the remote-control of electric lamps and the like." P. S. Veronin. February 10th, 1938. (524,848.)

4296. "Railway traffic-controlling apparatus." Westinghouse Brake & Signal Co., Ltd. March 12th, 1938. (524,872.)

4303. "Seals for mercury-vapour rectifiers and the like." General Electric Co., Ltd., and J. H. Partridge. February 9th, 1939. (524,873.)

4304. "Electric-discharge lamps." General Electric Co., Ltd. (Patent-Treuhand Ges. für Elektrische Glühlampen). February 9th, 1939. (524,874.)

4306. "Electrical control of copy milling machines." British Thomson-Houston Co., Ltd. February 9th, 1938. (524,875.)

4307. "Electric convertor systems." British Thomson-Houston Co., Ltd., J. W. Boag and J. C. Read. February 9th, 1939. (524,933.)

4308. "Explosive projectiles (such as bombs or aerial torpedoes) and electrical apparatus for controlling their movement during flight." Sperry Gyroscope Co., Inc. February 15th, 1938. (524,876.)

4318. "Electrical mechanisms for controlling a flexible traction member." V. B. M. Mallentjer. February 9th, 1939. (Addition to 519,839.) (524,879.)

4324. "Vibratory switches for converting direct-current into alternating-current." V. Valchera. February 9th, 1939. (524,880.)

4392. "Means for minimising radio interference by spark-ignition coils." J. Lucas, Ltd., and E. A. Watson. February 10th. 1939. (524,893.)

4425. "Electric power cable systems." Okonite-Callender Cable Co., Inc. February 12th. 1938. (524,936.)

4426. "Electrical frequency changers." E. R. & F. Turner and E. W. Krebs. February 10th, 1939. (524,904.)

4427. "Electrical switches for battery-operated devices." Ever Ready Co. (Great Britain), Ltd. (National Carbon Co., Inc.). February 10th, 1939. (524,905.)

4433. "Indicators of the state of charge of an electric accumulator." Standard Telephones & Cables, Ltd., H. J. Ward and R. H. Dunn. February 10th. 1939. (524,906.)

4438. "Wave transmission system." Electric & Musical Industries, Ltd., and F. R. Trott. February 10th, 1939. (Addition to 495.815.) (524,907.)

4439. "Wave transmission systems." Electric & Musical Industries, Ltd., and F. R. Trott. February 10th, 1939. (Addition to 495.815.) (524,908.)

4465. "Dynamo-electric machines." British Thomson-Houston Co., Ltd., and J. H. Walker. February 10th, 1939. (524,944.)

4709. "Electric-discharge device circuit arrangements." W. H. A. Thiemann (Bendix Aviation Corporation). February 13th, 1939. (524,964.)

4847. "Fluorescent substances." British Thomson-Houston Co., Ltd., and J. T. Anderson. February 14th, 1939. (Cognate application 4997/39.) (524,854.)

5022. "Method of discharging static electricity from bodies." Bendix Aviation Corporation. February 23rd, 1938. (524,912.)

10248. "Radio receivers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 4th, 1938. (524,733.)

19221. "Oil-cooled electric condensers." Philips Lamps, Ltd. July 4th, 1938. (524,735.)

30967. "Telegraph transmitters and receivers." Standard Telephones & Cables, Ltd. (W. Hatton). February 10th. 1939. (Divided out of 4432/39.) (524,917.)

Electricity Supply (*concluded*)

kr. during the year to the total of 396,700,000 kr. (£23,338,000), on which sum the yield works out at an average of 5.8 per cent. The quantity of electricity supplied constituted a record, totalling 3,096 million kWh, 300 million kWh more than in 1938.

TRANSPORT

Newcastle-on-Tyne.—NEW TROLLEY-BUS ROUTE.—The City Transport and Electricity Committee is to provide an alternative trolley-bus route along Albion Row to connect Shields Road and City Road. The distance is about half a mile and the cost of overhead equipment will be £650. The work will be carried out by the Transport Department, and all necessary materials will be drawn from stock. The sanction of the Ministry of Transport is to be sought.

Sunderland.—ANNUAL REPORT.—Further details are available regarding the results of the working of the Corporation's tramway service during the year ended March 31st last. The transport manager (Mr. C. A. Hopkins) in his report states that all routes, with the exception of Durham Road, showed decreases in passengers, mileage and receipts. The net balance was £13,316, compared with £21,342 the previous year. The report states that operating costs rose by 0.446d. per mile, but points out that, due to the general upheaval, an analysis of costs was meaningless. The abandonment of the Roker illuminations caused a considerable loss of revenue. Receipts totalled £147,950, compared with £152,319 the previous year, and the number of passengers carried was 34,966,544, compared with 36,178,731. Miles run totalled 2,109,017, against 2,285,980. The average fare charged per mile was 0.65d., and the average number of miles covered daily by each of the 84 tramcars was 110.3. The average traffic revenue per mile was 16.836d. The number of kWh consumed was 4,926,358. Average working expenses per mile were 12.839d., including power cost. The outstanding debt on the trams amounted to £75,346.

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.

New Companies Registered

Oldfield Electric, Ltd.—Private company. Registered September 2nd. Capital, £200. Objects: To acquire the business of an electrical and radio engineer, radio and general dealer, carried on by C. E. Tudor, at 263, Great Cheetham Street East, Higher Broughton, Salford, 7, as Oldfield Electric. Directors: C. E. Tudor, 14, Roston Road, Broughton, Salford, 7; and S. Peers, 263, Great Cheetham Street East, Higher Broughton, Salford, 7.

General Telephone Systems, Ltd.—Private company. Registered September 4th. Capital £1,000. Objects: To carry on the business of manufacturers of and dealers in telephonic, telegraphic and television apparatus, transmitting and receiving sets, &c. The first directors are: The Rt. Hon. Hastings B. Lees-Smith, F. J. Feld and R. A. Harting. Solicitors: Stoneham & Sons, 108a, Cannon Street, E.C.4.

Ultro Heat, Ltd.—Private company. Registered September 4th. Capital, £600. Objects: To carry on the business of manufacturers and repairers of dynamos, motors, batteries, insulators, stoves and cookers, heating and ventilating manufacturers, fire protection experts and advisers, manufacturers of and dealers in electrical and hot-water radiators and fittings, &c., and to adopt an agreement between H. Harvey and A. R. Walton of the one part and H. B. Shepherd of the other part. Life directors: H. B. Shepherd, "Swithland," 1, Clifton Drive, Styal Road, Heald Green, Ches.; and A. R. Walton, "Ailsa Craig," Bolshaw Road, Cheadle, Ches. Registered office: Mosley Chambers, 35, Great Underbank, Stockport.

R. F. Gilson, Ltd.—Private company. Registered September 6th. Capital £500. Objects: To carry on the business of electrical engineers and contractors, manufacturers of cinematographs, wireless, &c. Directors: R. F. Gilson, 6a, High Street, Wimbledon, S.W.19; R. B. Gilson, 24, Stane Way, Ewell, Surrey; and G. H. A. May, 32, Seymour Avenue, Morden Park, Surrey. Registered office: 11a, St. George's Road, Wimbledon, S.W.19.

Bowdens (Electrical), Ltd.—Private company. Registered September 15th. Capital, £1,000. Objects: To adopt an agreement with J. H. Bowden and F. L. Hall, and to carry on the business of manufacturers of and dealers in scientific instruments and apparatus, and mechanical and electrical instruments, machines and devices, mechanical and electrical enginers, &c. Directors: J. H. Bowden, 12, Beadon Road, Bromley, Kent; E. R. Fayat, "Highlands," Cameron Road, Bromley; and A. S. Dixon, 37, Celveden Mansions, Highgate Road, N. Regd. offices: King's Bourne House, 229-231, High Holborn, W.C.

Companies' Returns

Statements of Capital

Cornwall Power Co., Ltd.—Capital, £400,000 in 250,000 ordinary and 150,000 preference shares of £1 each. Return dated May 9th. All shares taken up. £190,007 paid on 40,007 ordinary and 150,000 preference. £209,993 considered as paid on remainder. Mortgages and charges nil.

Jewel Battery, Ltd.—Capital, £5,000 in 2,500 ordinary and 2,500 preference shares of £1 each. Return dated May 9th. 2,000 preference and 600 ordinary shares taken up. £2,600 paid. Mortgages and charges nil.

Urban Electric Supply Co., Ltd.—Capital, £1,050,000 in 2,800,000 ordinary shares of 5s. and 350,000 preference shares of £1. Return dated May 9th. 700,000 ordinary and 350,000 preference shares taken up. £356,256 5s. paid on 425,025 ordinary and 250,000 preference shares. £168,743 15s. considered as paid on 274,975 ordinary and 100,000 preference. Mortgages and charges nil.

Burgess Hill Electricity, Ltd.—Capital, £65,000 in £1 shares. Return dated May 13th. 52,250 shares taken up. £50,400 paid. £1,850 considered as paid. Mortgages and charges nil.

Seaford and Newhaven Electricity, Ltd.—Capital, £120,000 in £1 shares. Return dated May 13th. All shares taken up. £106,000 paid (£1 on 92,000 and 10s. on 28,000 shares). Mortgages and charges nil.

Shanghai Electric Construction Co., Ltd.—Capital, £700,000 in £1 shares. Return dated May 14th. All shares taken up. £417,000 paid. £253,000 considered as paid. Mortgages and charges nil.

Dunoon and District Electricity Supply Co., Ltd.—Capital, £200,000 in £1 shares. Return dated May 14th. 160,000 shares taken up. £160,000 paid. Mortgages and charges nil.

Bungay Gas and Electricity Co., Ltd.—Capital, £30,000 in 15,000 preference and 15,000 ordinary shares of £1. Return dated May 15th. 2,092 preference and 7,747 ordinary shares taken up. £4,513 paid on 2,092 preference and 2,421 ordinary. £5,326 considered as paid on 5,326 ordinary. Mortgages and charges £9,200

Premier Accumulator Co., Ltd.—Capital, £100 in £1 shares. Return dated May 21st. 2 shares taken up. £2 paid. Mortgages and charges nil.

Rutland Electric Lamp Co., Ltd.—Capital, £500 in £1 shares. Return dated May 22nd. 100 shares taken up. £100 paid. Mortgages and charges nil.

West London and Provincial Electric, and General Trust, Ltd. — Capital, £390,000 in £198,000 ordinary stock and £192,000 preference stock. Return dated May 22nd. All stock taken up. £264,000 paid. £126,000 considered as paid. Mortgages and charges, £200,000.

London Electric Wire Co. and Smiths, Ltd.—Capital, £1,250,000 in 750,000 ordinary and 500,000 preference shares of £1. Return dated May 23rd. 684,070 ordinary and 400,000 preference shares taken up. £350,035 paid on 35 ordinary and 350,000 preference shares. £734,035 considered as paid on 684,035 ordinary and 500,000 preference shares. Mortgages and charges nil.

Bylock Electric, Ltd.—Capital, £15,000 in £1 shares. Return dated May 24th. 7,150 shares taken up. £7,150 paid. Mortgages and charges, £6,500.

Sheerness and District Electric Supply Co., Ltd.—Capital, £110,000 in £1 shares. Return dated May 24th. All shares taken up. £85,000 paid. £25,000 considered as paid. Mortgages and charges nil.

East Anglian Electric Supply Co., Ltd.—Capital, £1,000,000 in 40,000 preference and 960,000 ordinary shares of £1 each. Return dated May 29th, 1940. 2,581 preference and 600,000 ordinary shares taken up. £563,419 paid on 122 preference and 563,297 ordinary shares. £39,162 considered as paid on 2,459 preference and 36,703 ordinary shares. Mortgages and charges, £750,000.

Increase of Capital

Broadcast Relay Service, Ltd.—The nominal capital has been increased by the addition of £250,000 beyond the registered capital of £1,000,000. The additional capital is divided into 200,000 redeemable cumulative preference shares of £1 each and 50,000 £1 shares of no special class.

Mortgages and Charges

Norjon Radio and Electrical Services, Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated August 26th, 1940, to secure all monies and liabilities now or to become due from or incurred by the company to the chargee. Holder: Mrs. H. C. Grylls, 28, The Terrace, Barnes, S.W.13. The above ranks in priority to the debenture created February 18th, 1938, but after a debenture dated November 30th, 1939.

H. D. Symons & Co., Ltd.—Mortgage on 18, Park Road, Kingston Hill, dated July 24th, 1940, to secure £800. Holders: H. Good, 14, Broadwalk, South Woodford; and others.

H. Howson & Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated August 27th, 1940, to secure £300. Holders: Hattersley and Ridge, Ltd., St. Mary's Works, Penistone Road, Sheffield.

Urban Electric Supply Co., Ltd.—Satisfaction in full on May 31st, 1923, of charge dated July 4th, 1918, supplemental to agreement contained in two letters dated June 15th and 19th, 1918, and registered July 15th, 1918. (Notice filed August 28th, 1940.)

Receiver Released

Conway, James and Co., Ltd.—F. Dodd, of The Cottage, London Road, Liphook, Hants, ceased to act as receiver and/or manager on August 21st, 1940.

Bankruptcy Proceedings

I. Harris, 39, Normanby Road, Scunthorpe, lately carrying on business at 40, Laneham Street, Scunthorpe, as an electrical contractor.—The receiving order herein was made on the debtor's own petition, and at the first meeting of creditors held recently at the Official Receiver's Office, 8, Flottergate, Great Grimsby, the statement of affairs showed liabilities of £114 and assets of £18. The case being a summary one was left in the hands of the Official Receiver, as trustee.

Irving Harris, electrical contractor, 39, Normanby Road, Scunthorpe, lately carrying on business at 40, Laneham Street, Scunthorpe.—The public examination was recently held at the Town Hall, Great Grimsby. According to the statement of affairs there was a deficiency of £95 on liabilities of £114. Debtor attributed his failure to the suspension of private building owing to the war. He commenced business as an electrical contractor in May, 1939. He had no capital, but obtained materials on credit. He discontinued trading at about Christmas, 1939, and since February last had been employed as an electrical fitter. His records disclosed that the turnover had been £219, and according to the deficiency account there was a net profit of £17. The examination was adjourned.

S. Herzberg, electrical dealer, 11, Victoria Dock Road, Canning Town, E.16. Trustee, Mr. H. Green, Dominion Buildings, South Place, E.C.2, released August 8th.

L. W. Russell (Russell's Radio Service) radio and electrical engineer, 142, Gravelly Hill North, Erdington, Birmingham.—Trustee, Mr. R. K. Clark, 37, Temple Street, Birmingham, Official Receiver, released August 28th.

R. A. Young, electrical and mechanical engineer, Gullet Passage, Shrewsbury.—First and final dividend of 9¾d. in the £, payable at 22, Swan Hill, Shrewsbury.

Reports and Dividends

The North Eastern Electric Supply Co., Ltd., is maintaining its interim dividend at 2½ per cent.

The British Power and Light Corporation, Ltd., has declared an interim dividend of 2 per cent. (same).

Walsall Conduits, Ltd., is maintaining its interim dividend at 20 per cent.

Trojan (Holdings), Ltd., reports dividends received from operating companies for the year to August 14th totalled £29,500 gross, an increase of £1,100 as compared with 1938-39. The sum received from Trojan, Ltd., was again £22,000. The net revenue is £17,566, as compared with £19,648. The ordinary dividend is maintained at 10 per cent., less tax, and £2,806 is carried forward (against £1,077 brought in).

STOCKS AND SHARES

TUESDAY EVENING.

THE Battles of the Air have exercised an effect upon Stock Exchange business similar to that imposed upon other branches of activity by disturbance of ordinary routine. Presumably the enemy centres bombed by our Air Force also are familiar with the interference to business caused by postal delays and hindrance to transport. Under present conditions, it is not to be expected that interest in stocks and shares will absorb the usual degree of attention in the public mind. This week, Stock Exchange attendance has been comparatively small, although numerically sufficient to deal with the daily volume of orders reaching the markets. Prices hold their ground with a degree of firmness that seems surprising in view of the surrounding circumstances. There are not many changes in our price-lists, but of what there are, the rises form a majority.

Gilt-edged Influences

London Electric Transport Finance 2½ per cent. guaranteed debenture stock, now standing at 90, is one of the securities guaranteed under the Trade Facilities Act and gives a flat yield of no more than 2¾ per cent. The issue is dated 1950-1955, the profit on repayment bearing, of course, no charge for income-tax. The stock is eligible for trustee investment. Another security in the same list is the London Transport 4½ per cent. T.F.A. stock of the London Passenger Transport Board, quoted at 102, and a third is the 5 per cent. guaranteed debenture stock of the North Metropolitan Power Station, dated 1957. The price of the last-named is 104, but no transactions are recorded in the stock since June 10th last. The strength of the 3½ per cent. War Loan serves to draw attention to similar issues. Sir Robert Kindersley, president of the National Savings Committee, in defending the lower yield offered by the 2½ per cent. War Bonds said, rather acidly, that if we attempt to split hairs over yields on our money at a time like the present, we have no right to ask or expect that our fighting forces should continue to try to protect us.

Home Railways

Hopes that the Charges (Railway Control) Consultative Committee would be able to finish its work last week were frustrated by the number of opponents who appeared against the proposals of the Railway Executive Committee for an advance in charges. The general reader of the Committee's discussions might feel tempted to think that a good deal of time was frittered away on matters which, to the layman, appear of little consequence. He, that layman, would have expected the inquiry to finish last week, instead of its being carried over the week-end to be resumed on Monday.

Pending the findings of the Committee, the prices of Home Railway stocks have swung within narrow limits. London Passenger Transport "C," which is quoted nominally at 28, came on offer at 26½. The purely gilt-edged stocks of the group remained unchanged. Southern Railway preferred and preference stocks have held their ground. Doubt lurks in the mind of the public on the point as to whether the companies may not suffer from air attack to an extent beyond that which the Government guarantee will cover.

Business in the ordinary shares of the home electricity companies is so quiet as to evoke the opinion from one of the principal dealers there that he had never known it so stagnant as it is now. Prices keep firm enough, and very little stock comes in except through the medium of sales on behalf of deceased accounts. The present proprietor of shares in these companies is too well satisfied with his investment for him to desire any change. On the other hand, demand is held in check by the possibility of damage to power stations.

The Advance in Prices

Improvements have taken place in the ordinary shares of London and provincial supply companies. British Power and Light ordinary are 1s. up, at 23s. 6d. The company has declared an interim dividend of 2 per cent., the same as that of a year ago. It is payable on October 1st. County of London at 29s. 3d. xd and Metropolitans at 30s. show gains of 1s. 3d. London Associated Electric also are better at 15s. 9d. Yorkshire Electrics strengthened to 30s., Midland Electric Power shares to 32s.; Clyde Valley at 31s. 3d. are 6d. up. Scottish Power remain at 28s. 9d. The overseas group is hardly changed: the only alteration is $\frac{1}{16}$ fall to 23s. 9d. in Madras Electric ordinary. Adelaide Electric 5 per cent. "A" preference stock has changed hands at 91½. The dividend is free of income-tax. River Plate Electricity ordinary stock marked 9s. 6d. a week ago. Victoria Falls ordinary shares have shown a little activity around 65s. The South African gold mining industry is flourishing despite higher taxation.

Mutual Insurance

It was mentioned here last month that discussions are in progress for the establishment of a mutual insurance fund upon which municipalities, electricity supply companies, and other distributors could rely for compensation in the case of damage being done to one station or to more. Knowledge of this intention served to bring about a change in the previous heavy condition of the market prices, and to lead to restoration of the previous levels. Now, however, the inquiry which arose for the shares, the result of which is seen in the recovery of prices, has faded away to a great extent, and it is being suggested that if a power station did happen to get hit, this might have a psychological effect upon the market as a whole.

Regarded dispassionately, and in the light of the firm attitude shown by the prices of leading industrial shares, such an apprehension would seem to be unlikely of fulfilment. Maybe it has the effect of checking the flow of money into the shares. At the same time the absence of supply operates in the other direction, and serves to keep prices hard.

Foreign Currency Stocks

Three months have now elapsed since the Treasury placed a ban upon dealings in the stocks and shares of companies whose dividends—if any—are paid in certain foreign currencies. American, Canadian, Japanese, Mexican and Brazilian issues figure amongst these, excepting in the cast of sterling securities. (On dealing in Canadian Pacific Railway preference stock, for example, there is no restriction: in the company's common shares, which are of dollar designation, ordinary transactions are forbidden.) The Treasury has been approached on several occasions by those to whom this ban is a matter of serious consequence, but nothing has yet been done to loosen the tight hold which the restriction imposes upon business in foreign-currency issues. It is still thought, however, that a way can be found to permit resumption of dealings without the enemy being able to take advantage of it by sales of holdings acquired either honestly or otherwise. In anticipation of some such action by the Treasury, the particular stocks quoted in our lists, and governed by the prices of June 18th last, when the regulation came into force, still retain their places in the tables overleaf, purely nominal though these prices are.

"No Stock"

Accustomed as he is, according to the practice of the past 150 years, to be able to deal with a comparative degree of freedom in practically all the markets of the Stock Exchange, the client of to-day girds at the obstacles with which he is presented when he comes—particularly at this moment—to buy the stocks and shares he desires to accumulate. Brokers themselves are exasperated and tantalised to find that, when they do get an order to buy shares of a well-known company, and in which shares there is normally a free market, they find, as often as not, that there are no shares on offer. They go round to all the jobbers who deal in them and the reply is the same in every case: "No stock."

There are, of course, plenty of instances in which freedom of dealing does prevail up to a point, but except in these cases the story is the same: "We have no seller, and we do not know where to find any shares." Daily experience shows how essential it is to emphasise this particular point, for the phrase "shortage of stock" has become so well-worn as to render its repetition mechanical, conveying no practical meaning to the prospective purchaser until he comes up against it in an effort to fill his requirements.

South Metropolitan Debenture

The South Metropolitan Electric Light and Power Co. has a 4½ per cent. debenture stock repayable at 100 in 1972, or after 1954 also at par. Of this stock there is £10,000 on offer at 106, giving a redemption yield of £3 18s. 6d., assuming repayment at 100 in 1955. Interest is due on the 1st January and July. The flat return of 4¼ per cent. will appeal to the investor who prefers to accept a modest rate of interest in order that he may obtain gilt-edged security. In the last published accounts, the company had £293,000 available to meet the interest, £56,250, payable on this particular issue. In the same company there is a 3¼ per cent. debenture stock of which a few hundred pounds can be obtained at 93. This pays 3¾ per cent. outright, and £3 17s. 6d. to redemption in 1972.

Miscellaneous Matters

Oriental Telephone shares have receded to 47s. 6d., the lowest price hitherto touched this year. Apparently there were a few sellers on behalf of deceased accounts; and, with markets in their present quiet condition, even a slight pressure to realise shares proved enough to unsettle the price. Telephone Rentals, at 6s., have gained a few pence. Cable and Wireless stocks are better, the ordinary advancing to 50, at which the return on the money is 8 per cent. The preference stock remains at 86, giving a yield at that price of £6 8s. per cent. The dividend was due in the ordinary way at the end of this month, but the chairman, at the last meeting, said that it was proposed to advance the dividend dates by a month. He did not, however, indicate whether the dividend at the end of next month would be paid for six months or for seven. Automatic Telephones are up 2s. 6d. to 37s. 6d. Mather & Platt at 33s. 3d. and S. Smith deferred at 6s. 3d. are better.

Anglo-American 6 per cent. preferred strengthened to 90, making a gain of 4 points in a fortnight. The deferred has risen 1. Anglo-Portuguese Telephone shares have further recovered to 15s., a gain of 2s. 6d., the recent drop to the neighbourhood of 10s. serving to direct attention to the shares and to the yield they offer. Thomas Tillings strengthened to 35s. British Electric Traction deferred continues to change hands with a certain degree of freedom around 600. There is a vague talk of Mexican matters having taken a turn for the better, but if this is the case, it has not yet been reflected in any support to Mexican utility issues.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 Highest	1940 Lowest	Dividend previous	Dividend Last	Middle Price Sept. 10	Rise or Fall	Yield p.c.
Home Electricity Companies							£ s. d.
Bournemouth and Poole	63/6	41/6	15	15	40/–	...	—
British Power and Light	30/–	21/–	7	7	23/6xd	+1/3	5 19 2
City of London	28/–	20/–	7½	7½	21/6	...	—
Clyde Valley	38/6	25/–	8	8	31/3	+6d.	5 2 5
County of London	43/3	22/–	10½	10½	29/6	+1/6	7 2 4
Edmundson's:							
7% Pref.	31/6	26/3	7	7	28/3	...	4 19 1
Ord.	27/6	18/6	9	6	23/–	...	5 4 4
Elec. Dis. Yorkshire	40/3	32/6	9	9	32/6	...	5 10 9
Elec. Fin. and Securities	41/3	34/6	12½	12½	38/9	...	6 9 0
Elec. Supply Corporation	46/3	37/–	12	11½	37/6	...	6 2 8
Isle of Thanet	16/–	5/6	4	4	6/–	...	13 6 8
Lancs Light and Power	33/–	25/–	7½	7½	26/3	...	5 14 3
Llanelly Elec.	21/–	17/–	5½	5½	17/6	...	6 5 9
Lond. Assoc. Electric	21/–	12/6	7	5½	15/9	+9d.	—
London Electric	37/6	19/–	8	7	20/–	...	7 0 0
London Power Deb. Red.	105½	101	5	5	100½	...	4 19 6
Metropolitan	41/6	23/6	12	10	28/9	...	6 19 2
Midland Counties	39/–	24/3	8	8	28/9	...	5 11 5
Mid. Elec. Power	40/–	29/6	9	9	32/–	+9d.	5 12 6
Newcastle Elec.	29/9	24/6	7	7	24/6	...	5 14 3
North Eastern Electric:							
Ordinary	31/6	17/6	7	7	22/6	...	6 11 9
7% Pref.	32/6	26/6	7	7	27/6	...	5 1 10
Northampton	48/–	39/–	10	10	38/9	...	5 3 3
Notting Hill 6% Pref. (£10)	10⅞	9	6	6	9	...	—
Northmet Power:							
Ordinary	42/3	23/–	10	10	28/9	...	—
6% Pref.	29/–	23/–	6	6	26/–	...	4 12 4
Richmond Elec.	24/6	18/–	7	6	18/9	...	—
Scottish Power	38/–	24/–	8	8	28/9	...	5 11 4
Southern Areas	21/3	13/9	5	5	13/9	...	7 5 6
South London	23/3	20/–	7	7	21/3xd	+1/9	6 11 9
West Devon	20/–	18/6	5	5	20/–	...	5 0 0
West Glos.	21/3	15/–	2⅛	4⅛	16/3	...	5 13 10
Yorkshire Elec.	40/–	24/6	8	8	30/–	+1/6	5 6 8
Overseas Electricity Companies							
Atlas Elec.	4/–	1/3	Nil	Nil	1/9	...	—
Calcutta Elec.	37/–	22/6	10*	8*	28/–	...	5 14 6
Cawnpore Elec.	30/–	24/–	10	10	25/–	...	8 0 0
East African Power	25/6	20/–	7	7	20/–	...	7 0 0
Jerusalem Elec.	24/–	17/9	7	7	18/9	...	7 9 4
Kalgoorlie (10/–)	12/6	9/6	7½	7½	11/–	...	6 16 5
Madras	26/9	23/6	8*	6*	23/9	+1/6	5 1 1
Montreal Power	35½	30	1½	1½	32	...	—
Palestine Elec. "A"	25/–	13/–	5*	Nil	13/9	...	—
Perak Hydro-electric	20/3	13/6	6	2½	13/9	...	3 12 9
Shawinigan Power	27¼	19	83cts.	90cts.	20½	...	—
Tokyo Elec. 6%	69	52	6	6	52½	...	11 8 6
Victoria Falls Power	75/9	56/–	15	15	65/–	...	4 12 4
Whitehall Investments Pref.	17/9	8/–	7½	7½	9/6	...	15 16 0
Public Boards							
Central Electricity:							
1950–70	110½	104	5	5	104½	...	4 15 8
1955–75	112½	106	5	5	105½	...	4 15 3
1951–73	107½	102	4½	4½	102½	...	4 7 10
1963–93	96½	90	3½	3½	90	...	3 17 9
London Elec. Trans Gtd.	92	87½	2½	2½	90	...	2 15 2
London & Home Counties							
1955–75	113½	105	4½	4½	105½	...	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	107	...	4 4 0
B	116	102½	5	5	104½	...	4 15 8
C	65½	25	1½	1½	28	...	5 7 2
West Midland Joint Elec.							
1948–68	106½	105	5	5	103½	...	4 16 9
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	190	...	4 14 9
Anglo-Am. Tel.:							
Pref.	106	85	6	6	90	+1	6 13 4
Def.	23⅞	18	1½	1½	19½	+1	7 13 10
Anglo-Portuguese	22/6	10/–	8	8	15/–	+½	10 13 4
Cable & Wireless:							
5½% Pref.	99⅞	70	4½	5½	86	...	6 8 0
Ord.	65	28½	4	4	50	+2	8 5 0
Income	99¾	93	...	...	97	...	4 0 0
Canadian Marconi $1	6/–	4/–	Nil	4cts.	4/3	...	—
Globe Tel. & Tel.:							
Ord.	32/6	21/6	7½*	6*	25/–xd	+3d.	4 16 0
Pref.	22/9	22/6	6	6	23/9xd	+3d.	5 1 1
Great Northern Tel. (£10)	20	11	20	20	12½	...	—
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	...	—
Marconi-Marine	30/–	18/3	10	7½	18/9	...	8 0 0
Oriental Telephone Ord.	2⅞	47/6	12*	11½*	2⅜	−⅛	4 16 10
Telephone Props.	15/–	11/–	5	6	12/6	...	9 12 0
Telephone Rentals (5/–)	9/6	5/9	10	10	6/–	+3d.	8 6 8
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	4/3	1/3	Nil	Nil	2/–	...	—
4% Inc.	11½	2	Nil	Nil	3½	...	—
British Electric Traction:							
Def. Ord.	830	440	5	45	600	...	7 10 0
Pref. Ord.	169	134	8	8	140	...	5 14 3
Bristol Trams	48/6	34/6	10	8*	35/–	...	—
Brazil Traction	12⅛	5⅛	$1	50c.	5⅛	...	—
Calcutta Trams	24/–	16/3	8	5⅛	17/–	...	6 9 4
Cape Elec. Trams	18/6	16/–	5	5	17/–	...	5 17 8
Lancs Transport	35/–	27/6	10	10	30/–	...	6 13 4
Mexican Light:							
1st Bonds	33	27	5	5	27⅛	...	—
Rio 5% Bonds	90	74	5	5	80	...	6 5 0
Southern Rly.:							
5% Prefd.	79	35	5	5	44	...	11 7 4
5% Pref.	104½	60	5	5	75	...	6 13 4
T. Tilling	45/9	31/–	10	10	35/–	+1/6	5 14 3
Tilling & B.A.	47/6	43/9	9*	8*	45/–	...	—
West Riding	35/–	26/–	10	10	30/–	...	6 13 4
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	10/–	15	Nil	14/–	...	—
Assoc. Elec.:							
Ord.	43/3	27/–	10	10	35/–	...	5 14 4
Pref.	35/3	32/3	8	8	33/9	...	4 14 10
Automatic Telephone & El.	47/3	32/–	12½	12½	37/6	+⅛	6 13 4
Babcock & Wilcox	50/–	28/6	10	11	32/6	...	6 15 4
British Aluminium Ord.	56/–	33/–	12½	12½	34/6	...	6 5 0
British Insulated Ord.	92/6	67/–	20	20	72/6	...	5 10 4
British Thermostat (5/–)	14/9	6/6	18⅛	18⅛	8/9	+⅛	10 11 6
British Vacuum Cleaner (5/–)	12/6	5/–	40	12½	6/3	...	10 0 0
Brush Ord.	4/6	1/9	Nil	Nil	2/6	...	—
Callender's	69/–	46/–	15	15	52/6	...	5 14 3
Chloride Elec. Storage	72/6	55/–	15	15	27	...	5 4 4
Consolidated Signal	72/6	59/–	36½	17	60/–	...	5 13 4
Crabtree (10/–)	24/9	17/6	17½	17½	20/–	...	8 15 0
Crompton Parkinson:							
Ord. (5/–)	20/–	12/6	30	20	15/–	...	6 13 4
E. K. Cole (5/–)	5/–	2/6	10	Nil	3/–	...	—
Elec. & Musical Industries (10/–)	10/3	4/3	5	Nil	6/9	+3d.	—
Electric Construction	36/3	30/–	13½	10	30/–	...	6 13 4
Enfield Cable Ord.	56/–	40/6	25	16⅔	45/–	...	7 13 0
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	...	5 0 0
English Electric	33/9	16/6	10	10	25/–	...	8 0 0
Ensign Lamps (5/–)	15/3	12/6	25	25	13/9	...	9 1 10
Ericsson Tel. (5/–)	39/3	25/–	25*	25*	25/–	...	5 0 8
Ever Ready (5/–)	28/3	17/3	30	40	24/6	+6d.	8 3 4
Falk Stadelmann	18/3	12/6	6	7	13/9	...	8 14 6
Ferranti Pref.	25/–	23/–	7	7	23/3	...	6 0 5
G.E.C.:							
Pref.	32/6	27/–	6½	6½	28/9	...	4 10 6
Ord.	83/3	56/–	20	20	69/6	−6d.	5 15 1
Greenwood & Batley	25/6	20/–	15	13	20/–	...	13 0 0
Hall Telephone (10/–)	18/6	8/9	15	10	10/–	...	10 0 0
Henley's (5/–)	21/6	13/6	20	20	16/3	...	6 3 1
4½% Pref.	21/3	20/6	4½	4½	21/3	...	4 4 8
Hopkinsons	46/9	33/6	12½	15	35/–	...	8 11 6
India-Rubber Pref.	21/–	20/–	5½	5½	20/9	...	5 6 0
Intl. Combustion	121/3	70/–	32½	32½	4	...	8 2 6
J. Lucas	60/6	40/–	15	15	50/–	...	6 0 0
Johnson & Phillips	50/9	33/–	12½	15	40/–	...	7 10 0
Lancashire Dynamo	59/9	47/6	25	20	47/6	...	8 8 5
Laurence Scott (5/–)	11/–	6/–	15	15	8/–	...	9 7 6
London Elec. Wire	25/6	20/–	7½	7½	22/6	...	6 13 4
Mather & Platt	46/6	30/–	13½	10	33/3	+9d.	6 0 4
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	...	5 3 6
Murex	86/9	52/6	20	20	70/–	...	5 14 4
Pye Deferred (5/–)	9/–	6/9	25	25	8/9	...	14 5 8
Revo (10/–)	20/9	12/6	17½	5	12/6	...	4 0 0
Reyrolle	60/6	41/–	12½	12½	43/9	...	5 14 2
Siemens Ord.	23/9	16/3	7½	7½	17/6	...	8 11 6
Strand Elec. (5/–)	2/3	9d.	10	4	1/3	...	10 0 0
S. Smith (1/–)	8/–	3/6	37½	50	6/3	+1/6	18 0 0
Switchgear & Cowans (5/–)	11/9	5/6	20	10	6/3	...	8 0 0
Telegraph Condenser (10/–)	8/9	6/3	5	...	8/9	...	—
Telegraph Construction	42/6	29/–	10	10	30/0	...	6 13 4
Telephone Mfg. (5/–)	9/–	5/–	9	9	5/6	...	8 3 8
Tube Investments	96/9	61/3	23¾	23¾	81/3	...	5 17 9
Vactric (5/–)	3/6	2/–	4	Nil	2/3	...	—
Vickers (10/–)	22/–	9/6	10	10	13/3	...	7 11 0
Ward & Goldstone (5/–)	19/9	12/6	20	20	12/6	...	8 0 0
Westinghouse Brake	46/–	32/9	17½	10	32/6	...	6 3 1
Walsall Conduits (4/–)	26/6	17/6	55	55	23/9xd	+6d.	9 5 0
West, Allen (5/–)	7/–	3/–	10	7½	3/9	...	10 0 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia. — SYDNEY. — October 24th. County Council. One 50,000-kW steam turbo-alternator set for the Bunnerong power station. (T. 16057/40.)*

MELBOURNE.—State Electricity Commission. October 15th. 4,000 ft. of cable for use on a three-phase 6.6-kV system. (T. 21227/40.)*

Birmingham.—September 27th. Electric Supply Committee. Storage batteries and charging equipment. (September 6th.

Burnley.—Town Council. September 16th. Electric lamps to institutions, &c., for the period October 1st, 1940, to March 31st, 1941. Tender form from Public Assistance Officer, 20, Nicholas Street; tenders to Town Clerk.

Fife.—September 17th. County Council. Various works, including electric lighting, at new police station, Falkland. Schedules from G. Sandilands, county master of works, Kirkcaldy (£1 1s.).

Manchester.—September 14th. Waterworks Committee. Three electrically driven centrifugal pumps, with motor starters, pipes, valves, &c. (August 23rd.)

September 16th. Electricity Committee. Supply and erection over a period of two years of 3-phase, 6,600-V substation switchgear. (August 30th.)

September 19th. Three water-tube boilers and auxiliaries, &c. (August 30th.)

Murton (Co. DURHAM).—Machinery required for a new bakery for the South-East Durham Co-operative Bakeries, Ltd., Murton, Co. Durham.

New Zealand.—WELLINGTON.—October 8th. Public Works Department. 20,000-kVA synchronous condenser with control and protective equipment. (T. 21199/40.)* Four 2,500-kVA transformers or alternatively eight 1,677-kVA transformers. (T. 21197/40.)*

October 15th. 66-kV outdoor switchgear and steelwork for Winton substation. (T. 21206/40.)*

South Africa.—PRETORIA.—Union Tender and Supplies Board. October 3rd. Distribution boards, switches and fuses, and switch boxes. (T. 21239/40.)*

October 24th. Three batteries (twenty-six 600 Ah cells each). (T. 21552/40.)* Miscellaneous electrical requisites. (T. 21549/40.)*

September 19th. Seven electric passenger lifts, two electric goods lifts and three electric service lifts at the new G.P.O. Building, Cape Town. (T. 21012/40.)*

October 10th. Public Works Department. Laundry machinery, including electric motors, for Krugersdorp Mental Hospital. (T. 21352/40.)*

One 15-kW Diesel engine lighting plant for the Agricultural College, Glen, O.F.S. (T. 21351/40.)*

CAPE TOWN.—October 8th. Electricity Supply Commission. Two 2,000-kVA transformers. (T. 21222/40.)*

JOHANNESBURG. — October 19th. City Council. Electric lamps. (T. 21542/40.)*

September 30th. S.A.R. and Harbours Administration. Electric lamps for the year ending December 31st, 1941. (T.Y. 21434/40.)*

October 24th. Public Works Department. L.v. underground cable. (T.Y. 21433/40.)*

PORT ELIZABETH.—October 24th. City Electrical Engineer's Department. Transformers, l.v. units, &c. (T.Y. 21558/40.)*

West Riding.—September 17th. County Council. Automatic refrigeration plant at Grenoside Institution, nr. Sheffield. Specifications from acting West Riding architect, County Hall, Wakefield. Tenders to the Clerk of the County Council, County Hall.

Orders Placed

Cardiff. — Transport Committee. Accepted. Ten trolley-bus chassis (£1,401 each).—Associated Equipment Co.

Eire.—SOUTH CORK.—Board of Public Assistance. Accepted. Electrical installation at Midleton Hospital (£738).—J. D. Carr & Co.

Llanelly. — Education Committee. Accepted. Installation of electric lighting in Market Street School.—Arthur and Thomas.

London. — WESTMINSTER. — Highways Committee. Accepted. Electrical equipment for salvage plant (£58).—Sun Electrical Co.

Nuneaton. — Electricity Committee. Accepted. Transformers (£4,834).—Yorkshire Electric Transformer Co. Switchboard (£1,668).—Ferguson, Pailin.

Stretford.—Highways Committee. Accepted. Modified street lighting (£1,268). —Metropolitan-Vickers Electrical Co.

Wood Green.—Emergency Committee. Recommended. Electrical work at fire station (£87).—Standard Telephones and Cables.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Banffshire.—School shelters; county clerk, County Offices, St. Leonards, Sandyhill Road, Banff.

Beverley.—Shelters, central and southern areas, for R.D.C.; surveyor, 36, Market Place.

Biggleswade.—Communal shelters for R.D.C.; surveyor, Ladbrooke House, London Road.

Bishops Stortford.—Additions to fire station, for U.D.C.; surveyor, Council Offices, Bishop's Stortford.

Blackburn.—Domestic and communal shelters; W. Pickstone, borough engineer, Town Hall.

Boldon (Co. Durham).—Air-raid shelters; Allison, Ltd., Whitburn, near Sunderland.

Bolton.—Club additions, Settle Street; St. William's Bowling Club.

Additions to works; Hick, Hargreaves & Co., Ltd.

Pumping plant (£2,500); Borough Surveyor's Department, Town Hall.

Boston.—Canning factory for United Canners, Ltd.; H. H. Vamplew, builder, Witham Place, Boston.

Brandon (Co. Durham).—Communal shelters; F. Hedley, U.D.C. architect.

Brighouse (Yorks).—Public shelters; borough engineer.

Burnham-on-Sea.—Water scheme, including construction of reservoir, &c. (£30,000), for U.D.C.; Surveyor's Office, Public Gardens.

Burnley.—Pit-head baths, Hargreaves' Colliery, Hapton Valley, for Miners' Welfare Commission, Romney House, Tufton Street, London, S.W.1.

Cardiff.—Communal and public shelters; city engineer, City Hall.

Cheadle (Ches).—Building as additions to works; W. Hargreaves & Co.

Chester. — Extensions to Paddock Garage; Grosvenor Motor Co.

Corby (Northants).—Houses, Oakley Road housing estate; Richmond Bros., builders.

Coventry.—Houses; H. Clarke & Son, Ltd., Coronation Road; Garlick's, Ltd., Far Gosford Street; J. G. Gray, Broad Street; Harris & Son, Ltd., 50, Cope Street; T. Dalton & Co., Ltd., Wyken; and W. H. Jones & Son, Ltd., Lockhurst Lane.

Extensions to police station; D. E. E. Gibson, city architect, 1a, Warwick Row, Coventry.

Cromer. — Communal shelters, for U.D.C.; G. E. Mitchell, surveyor, Council Offices, Cromer.

Croydon. — Public surface shelters; borough engineer, Town Hall.

Darlington. — Air-raid shelters at works; W. Lyall, 19, Victoria Road, Darlington.

Dartford.—Fire station; borough surveyor, 3, High Street.

Dorking.—Public shelters, for U.D.C.; surveyor, Council Offices, Pippbrook, Dorking.

Durham.—Domestic shelters for R.D.C.; J. N. Adams, Durham Rural District Council Offices, Durham.

Police superintendent's house for C.C.; W. J. Merrett, county surveyor, 20, Old Elvet, Durham.

Cleansing station, Wolsingham; county surveyor.

East Retford.—Public shelters; R. E. Wilson, borough surveyor, Municipal Buildings, Retford, Notts.

Egham.—Shelters, for U.D.C.; surveyor, Council Offices, 155, High Street.

Eire.—CORK.—Houses at Blackrock and Dripsey, for South Cork Board of Health.

WICKLOW. — Sewerage scheme, for County Board of Health; J. Sheehan, acting secretary, Boardroom, Rathdrum.

Elgin.—Nurses' rooms, &c.; medical superintendent.

Ellesmere Port (Ches).—Domestic and communal shelters, for U.D.C.; C. W. Davies, surveyor, Council Offices.

Gellygaer.—Shelters for U.D.C.; F. Read, surveyor, Council Offices, Hengoed.

Gloucester.—Alterations to Fluck Convalescent Home; city engineer, Guildhall.

Hemel Hempstead.—Air-raid surface shelters at eleven schools; borough surveyor, Market Square, Hemel Hempstead.

Houghton-le-Spring (Co. Durham).—Domestic shelters at an estimated cost of about £3,000; V. J. Hunter, surveyor, Urban District Council Offices, Houghton-le-Spring.

Jarrow.—Sanction received to build an auxiliary fire station; J. S. Weir, borough engineer, Town Hall, Jarrow-on-Tyne.

Lancashire.—Junior school at Maghull; S. Wilkinson, county architect, County Offices, Preston.

Leek.—Public shelters in seven villages for R.D.C.; surveyor, R.D.C. Offices.

Littleborough.—Shelters for U.D.C.; James Berry, Ltd., Chapel Street, Heywood.

Liverpool.—Alterations to Rosebank House, Huyton, for school; Rev. Fr. P. Kennedy, P.P., St. Columba, Longview Estate, Huyton, Liverpool.

Additions to X-ray department, Alder Hey Hospital; city architect, Blackburn Chambers, Dale Street, Kingsway, Liverpool, 2.

London.—WANDSWORTH.—Public shelters (£10,000); borough engineer, Municipal Buildings, S.W.18.

Mansfield Woodhouse.—Fire station and houses for U.D.C.; Lawrence Walker, surveyor, Council Offices, Manor House.

Middlewich (Cheshire).—Public shelters for U.D.C.; surveyor, Council Offices, Middlewich.

Mold.—Conversion of part of Market Hall into fire station, for U.D.C.; surveyor, Town Hall, Mold, North Wales.

Newburn (Northumberland).—Air-raid shelters at schools for County Council; W. W. Tasker, county architect, County

Council offices, Mitford Road, Morpeth, Northumberland.

Newcastle-on-Tyne.—Alterations to the Forester's Arms Hotel; E. M. Lawson, architect, Barras Buildings, Barras Bridge, Newcastle.

Erection of shelters at five maternity and child welfare centres for the City Council (£1,750); A. Anderson (Contractors), Ltd., builders, 1, Stanmore Road, Newcastle.

Shelter at Municipal College of Commerce; education architect, Northumberland Road, Newcastle.

Norfolk.—Communal domestic surface shelters; county architect, 25, Thorpe Road, Norwich.

Northern Ireland.—BANBRIDGE.—Six shelters (50 persons each), for U.D.C.; Town Clerk's Office, Banbridge, Northern Ireland.

Norton Radstock.—Public shelters for U.D.C.; surveyor, High Street, Midsomer Norton.

Northumberland.—Air-raid shelters at schools at Corbridge and Ashington; W. W. Tasker, county architect, County Council Offices, Mitford Road, Morpeth, Northumberland.

County Council has received sanction for loan for additional cottages and a canteen at St. Anthony's Colony; county architect.

Otley.—Addition to tannery; W. Lawson & Sons, Ltd., leather factors.

Plympton St. Mary.—Seven surface shelters, for R.D.C.; engineer, Council Offices, Plympton.

Preston.—Domestic and communal shelters; borough surveyor, Town Hall, Preston.

Prudhoe (Northumberland). — Communal shelters; county architect, County Offices, Morpeth.

Pudsey (Yorks).—Public shelters; borough engineer.

Rawtenstall.—A.R.P. works for four schools; borough engineer.

Rhondda.—Public shelters (21), and street shelters (44), for U.D.C.; surveyor, Council Offices, Pentre.

St. Andrews.—Public shelters to cost £1,218; borough surveyor.

Salford.—Branch library at Seedley (£15,000); W. A. Walker, borough engineer, Town Hall.

Sheffield.—Cleansing station; W. G. Davies, city architect, Town Hall.

Extensions to works; S. Osborn & Co., Ltd.

Workshops, air-raid shelter, &c.; R.E.P. Engineering Co., Ltd.

Workshop; J. W. Best & Co., St. Peter's Close, Sheffield.

Skipton.—Methodist Chapel and Sunday Schools; J. Hartley & Son, architects, Swadford Chambers, Skipton.

Staines.—Boiler house; Croggan & Co.

Stanley (Yorks).—Public shelters on nine sites, for U.D.C.; A. W. Quibell, surveyor, Council Offices.

Staveley.—Communal shelters at Barrow Hill, Millgreen and Hollingwood, for U.D.C.; Greenwood's (Mansfield), builders, Wood Street, Mansfield.

Public shelters in Middlecroft area for U.D.C.; Houlton & Kington, architects, Furnival Chambers, Chesterfield.

Stone.—Barlaston and Tittensor sewerage scheme for R.D.C.; Thos. Coates (1927), Ltd., contractors, Victoria Buildings, Bury.

Stretford.—Works extensions: E. Boydell & Co., Ltd.

Stroud.—Communal domestic shelters, for U.D.C.; clerk, Council Chambers, High Street, Stroud.

Sunderland.—Alterations to the Phoenix Inn; Tate and Holmes, builders, Benwell Village, Newcastle-on-Tyne.

Domestic surface shelters; J. E. Lewis, Town Hall, Sunderland.

Shelters at clinics; borough engineer.

Swansea.—Cleansing stations; Borough Architect's Offices, The Guildhall.

Tiverton.—Extensions to Red House, for Wiggins, Teape & Co., Ltd.

Torquay.—School shelters (£22,000); borough engineer.

Tunbridge Wells.—Fire station; H. P. Bishop, borough surveyor, "Linden," Linden Park, Tunbridge Wells, Kent.

Upholland.—Shelters (13), for U.D.C.; surveyor, Alma Hill, Upholland, Wigan.

Wallingford.—Mortuary for R.D.C.; surveyor, Council Offices.

Walsingham.—Houses (6), Wighton, for R.D.C.; surveyor, Council Offices, Fakenham, Norfolk.

Yorkshire.—Shelters at further schools for the North Riding C.C.; county architect, County Hall, Northallerton.

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from September 4th.

Lectralevel. No. 611732. Class 9 (IV). Electric apparatus for automatically controlling the liquid level in sewage systems, and in tanks and similar liquid containers. Londex, Ltd., 207, Anerley Road, S.E.20.

Stewart-Warner. No. 602849. Class 9 (IV). Radio receiving sets, radio gramophones, etc. Stewart-Warner Corporation, Chicago, Ill., U.S.A. (British representative, C. Lockett Hughes, 46, Bedford Row, W.C.1.).

Trulite. No. 611745. Class 9 (IV). Dry batteries. Trulite, Ltd., 156, Moor Street, Birmingham.

Smiths and Anvil (design only). 608035. Class 11 (IV). Electric desk, table and wall lamps, and electric ornamental lamp stands, torches, and heated towel-drying rails. Platers and Stampers, Ltd., Colne Road, Burnley, Lancs.

Berec (lettering and design). No. 612376. Class 11 (IV). Electric lamps and torches. The Ever Ready Co. (Great Britain), Ltd., Ever Ready Works, Hercules Place, Holloway, N.7.

New Books

Electric Railways in India. By Shiv Narayan Pp. 128; figs. 32. Aryabhushan Press, Poona, India.

This work, which embodies information derived from a number of sources, was compiled, the author states, because particulars relating to the railways of India as a whole were not previously available under one cover. After some historical introductory matter and data regarding electric traction in other countries come chapters devoted to the Great Indian Peninsula, the Bombay, Baroda and Central India and the South Indian Railways, in which salient particulars are given of generation, transmission and overhead equipment as well as the rolling stock. Later chapters deal with Diesel-electric locomotives and single-phase projects.

In a short section on electric vehicles for cities and factories, the statement that in Great Britain there are "about half a million electrical vehicles" would appear to indicate "wishful thinking" or a serious clerical error. Elementary calculations for ascertaining performance and statistics of various kinds provide concluding chapters. Information on various aspects of traction is provided in eight appendices. As no marked developments in railway electrification in India are to be expected during the war or for several years afterwards, this book should retain its utility for a longer period than do most of the same character.—C. O. B.

General Physics. By W. L. Whiteley. Pp. 590, over 500 figs. University Tutorial Press, London: Clifton House, Euston Road, N.W.1. Price 7s. 6d.

The subject which goes under the title of "physics" can be regarded as comprising the principal sciences which form the basis of engineering technology. Thus, the study of physics can be considered as essential to the electrical engineer if he is to possess that fundamental knowledge which will enable him to understand the many principles involved in the design and operation of the machinery, instruments and other equipment with which he has to deal. It is for this reason that physics is one of the subjects to be found in the various school-leaving examinations, such as the matriculation, which constitute the first step towards the higher examinations in engineering science.

In the book under review the sciences dealt with are mechanics, heat, light, sound and magnetism, and electricity in the order named, and the author has—perhaps unconsciously—attached to each of them that relative importance which we would regard as being most desirable for the electrical engineering student.

Each subject is dealt with up to the standard of the matriculation examination of the London University, but the factor which distinguishes this book from the many others which are available on the same subject is the prominence given to the experimental investigation of the principles under discussion. Moreover, in the majority of cases, the apparatus used for the experiments is of such a simple nature that the student could readily construct it for himself. A certain amount of mathematics is necessarily called for, but this is of the simplest nature and a numer of numerical exercises are worked out in the course of the text.

Each chapter is accompanied by a number of such examples—many of them taken from matriculation exam. papers—and the numerical answers are given. The many diagrams have been carefully and clearly drawn, and altogether the book is extremely good value for the low price charged. It can be confidently recommended to the student on the threshold of his studies for the various electrical engineering examinations, while the fully fledged engineer whose examination days are behind him would certainly profit from a perusal of its pages.—A. R.

Practical Cable Jointing. Pp. 341; figs. 476. W. T. Henley's Telegraph Works Co., Ltd., Milton Lodge, Burford, nr. Dorking. Price 5s.

The fourth edition of this standard work differs mainly from its predecessors in the inclusion of matter relating to cold-filling compound for normal use up to 11 kV where the use of flame is impermissible on safety grounds or where the compound would have to be taken to a point remote from the source of heat. It is outside the scope of the work to deal with the emergency use of cold-filling compound for high-voltage joints and sealing ends, information regarding which can (and, in present conditions, should) be obtained from the cable manufacturers.

For the rest, the same method of detailed instructions and step-by-step pictorial explanation of jointing processes that was so admirable a feature of earlier editions has been followed in the present instance. It only remains to repeat our recommendation, made previously, that all concerned in the installation of cables, whether as engineers or jointers, should acquire a copy of this essentially practical book.—C. O. B.

Electrical Communication. By Arthur Lemuel Albert. Pp. 534; figs. 39. Chapman & Hall, Ltd., 11, Henrietta Street, W.C.2. Price 30s.

This book, published six years ago, has been revised and brought up to date by this second edition. It covers the fundamental principles of electrical communication, wire and wireless. Mathematical treatment is sometimes employed, but the text can be intelligently followed with only an elementary mathematical knowledge. The book is about 25 per cent. larger than the first edition and has been revised and rewritten where necessary to bring out the latest developments.

A list of questions is given at the end of each chapter and an extensive bibliography of American literature. This bibliography, combined with the index, makes it a good book of reference for communication engineers from the point of view of American practice, but it is primarily intended as a textbook for imparting a broad view of the whole field of electrical communication. The subjects dealt with have been carefully selected to give a good insight into the fundamental theory underlying the various means of communication. They are ably dealt with, and the matter is well up to date.—C. G. C.